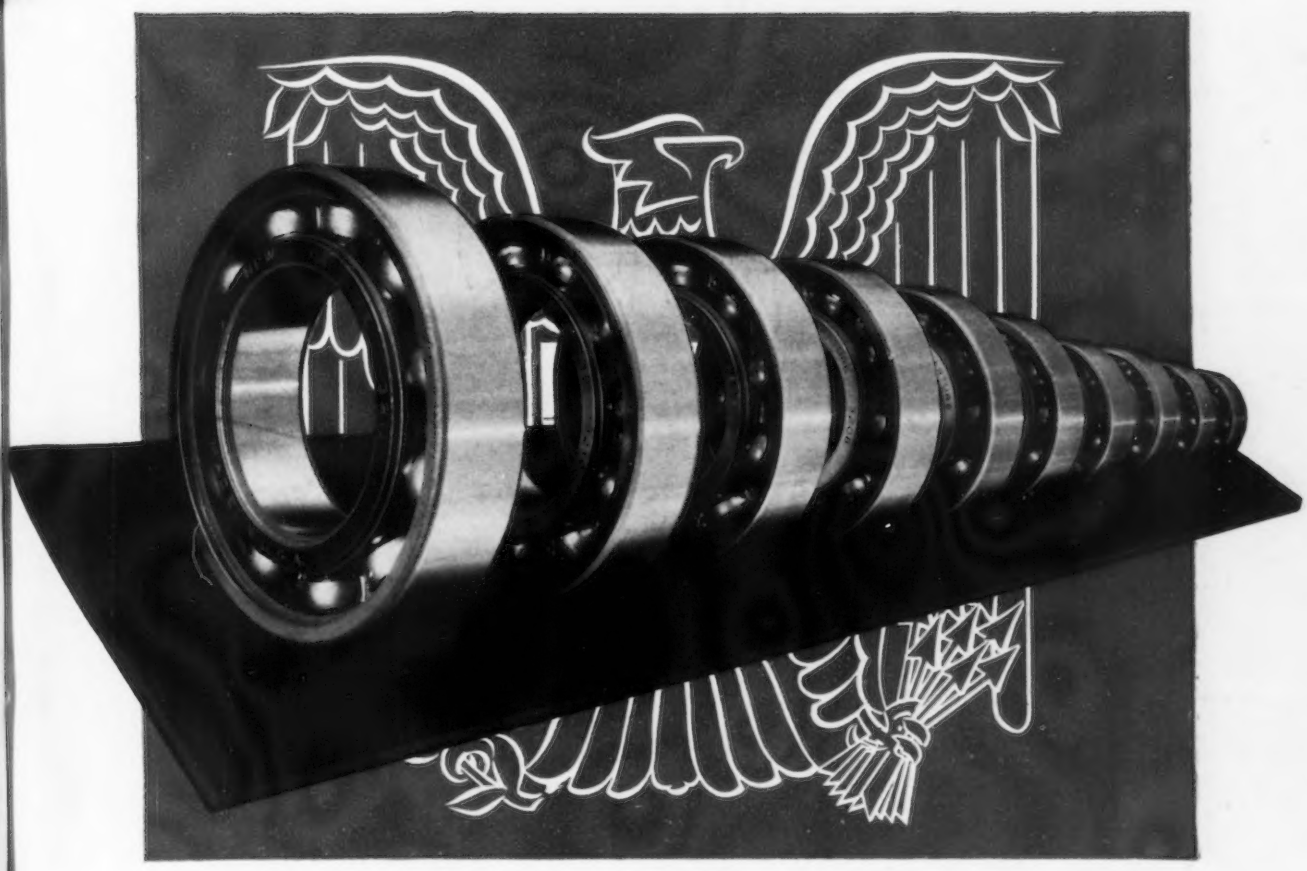
Engin.
brary

OVEMBER 18, 1943

The IRON AGE

NOV 2 3 1943



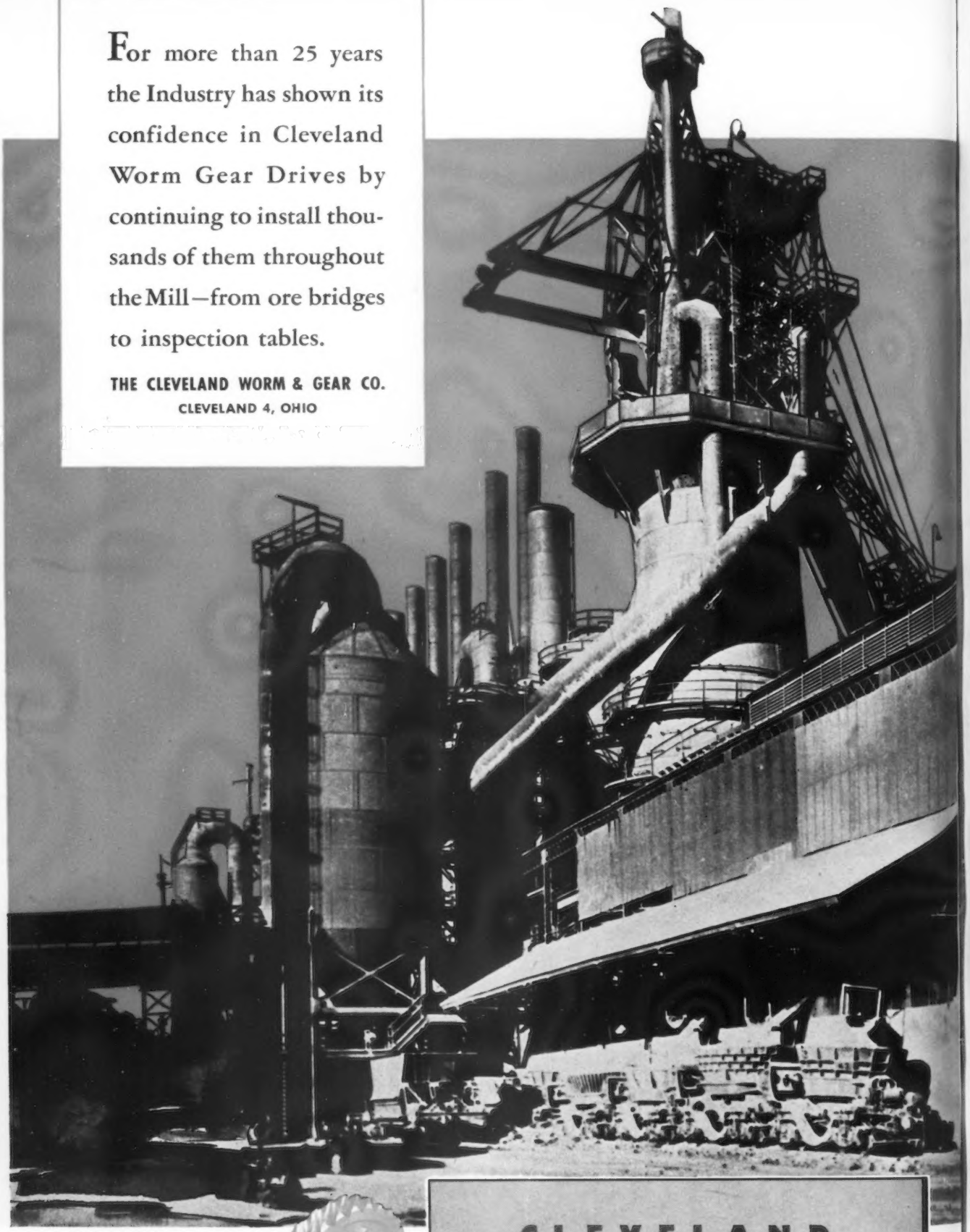
ON EVERY BATTLEFRONT

—keeping them flying, rolling, moving, at every point where shafts turn, where motion must be friction-free.

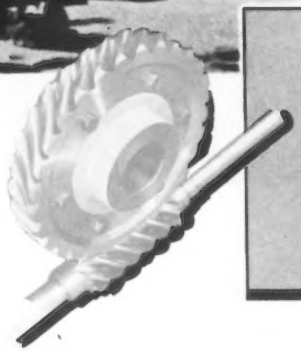
New Departure
BALL BEARINGS

For more than 25 years the Industry has shown its confidence in Cleveland Worm Gear Drives by continuing to install thousands of them throughout the Mill—from ore bridges to inspection tables.

THE CLEVELAND WORM & GEAR CO.
CLEVELAND 4, OHIO



Courtesy of Republic Steel Corporation



CLEVELAND
WORM GEAR
SPEED REDUCERS

THE IRON AGE, published every Thursday by the *CHILTON CO. (INC.)*. Entered as second class matter November 8, 1932 at the Post Office at Philadelphia under act of March 3, 1879. $8 yearly in North America and South America, Foreign $15. Vol. 152, No. 21.

J. H. VAN DEVENTER
President and Editor

C. S. BAUR
Vice-President & General Manager

o o o

Editorial and Advertising Offices
100 East 42nd St., New York 17, N. Y., U. S. A.

O. L. Johnson, Market Research Mgr.
B. H. Hayes, Production Manager.
B. E. Baur, Typography and Layout.

o o o

Regional Business Managers

C. H. OBER, New York 17, 100 East 42nd St.
H. E. LEONARD, New York 17, 100 East 42nd St.
ROBERT F. BLAIR, Cleveland 14, 1016 Guardian Bldg.
W. J. FITZGERALD, Pittsburgh 22, 428 Park Bldg.
B. L. HERMAN, Philadelphia 39, Chilton Bldg.
H. K. HOTTENSTEIN, Chicago 3, 1134 Otis Bldg.
PEIRCE LEWIS, Detroit 2, 7310 Woodward Ave.
D. C. WARREN, Hartford 1, Conn., P. O. Box 81
R. RAYMOND KAY, Los Angeles 28, 2420 Cheremoya Ave.

o o o

Owned and Published by
CHILTON COMPANY
(Incorporated)

Executive Offices
Chestnut and 56th Sts.,
Philadelphia 39, Pa., U.S.A.

OFFICERS AND DIRECTORS
C. A. MUSSELMAN, *President*
JOS. S. HILDRETH, Vice-President
GEORGE H. GRIFFITHS, Vice-President
EVERIT B. TERHUNE, Vice-President
J. H. VAN DEVENTER, Vice President
C. S. BAUR, Vice-President
WILLIAM A. BARBER, Treasurer
JOHN BLAIR MOFFETT, Secretary
JULIAN CHASE, THOMAS L. KANE
G. C. BUZBY, P. M. FAHRENDORF
HARRY V. DUFFY, CHARLES J. HEALE

o o o

Member, Audit Bureau of Circulations

Member, Associated Business Papers

o o o

Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price North America, South America and U. S. Possessions, $8; Foreign, $15 a year. Single Copy, 35 cents.

o o o

Cable Address, "Ironage N. Y."

o o o

Copyright, 1943, by Chilton Company (Inc.)

This Week in The IRON AGE

Vol. 152, No. 21 November 18, 1943

Editorial

Wanted—A Bond Holders' Protective Committee 41

o o o

Technical Articles

Developments of the American Tin Plate Industry 44
Producing Tubular Railway Axles 48
Chrome Ore and Chrome Magnesite 52
Thermal Reduction of Magnesium Compounds—I 56
Current Zinc Electroplating Practice 64
Needled Steel Specifications 67
New Equipment—Small Tools 68

o o o

Features

News Front 43
Assembly Line 72
Washington 76
West Coast 80
Fatigue Cracks 84
Dear Editor 86

o o o

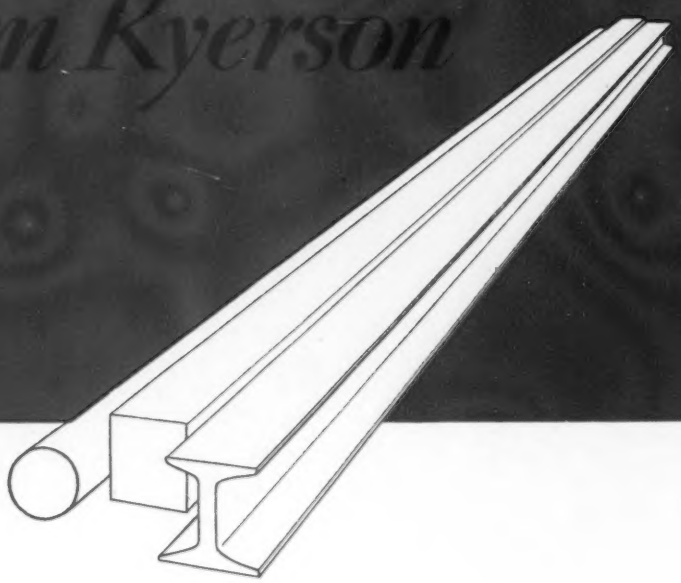
News and Markets

Study of 300 Months Shows Post-War Trends in Steel 91
Large Assembly Units Assist Construction of DE Ships 100
Third Installment of Seized Metalworking Patents 104
Personals and Obituaries 170
Machine Tool News 172
Non-Ferrous Metals News and Developments 174
Non-Ferrous Metals Prices; Scrap Prices 175
Iron and Steel Scrap News and Prices 176
Comparison of Prices by Year 178
Finished Iron and Steel Prices 179
NE Steel and Warehouse Prices 180
Stainless Steel, Tool Steel Prices 181
Semi-Finished Iron and Steel Prices 181
Pig Iron Prices 184
Ore and Coke Prices 185
Ferroalloy Prices 186

o o o

Index to Advertisers 267

WAR STEEL... *quickly from Ryerson*



Steel for weapons—for essential industries—steels for maintenance—special aircraft steels and NE alloys—all are immediately available in Ryerson stocks! When shortages occur, Ryerson technical experience finds an alternative. When speed is paramount, Ryerson operating men make delivery on time. Call Ryerson first, whatever your steel requirements, for prompt, effective cooperation! Joseph T. Ryerson & Son, Inc.; Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

RYERSON STEEL-SERVICE

The
IRON AGE
ESTABLISHED 1855

o o o

Nov. 18, 1943

o o o

J. H. VAN DEVENTER
President and Editor

C. S. BAUR
Vice-President and General Manager

o o o

A. H. DIX
Manager, Reader Service

o o o

Managing Editor.....T. W. LIPPERT
News, Markets Editor...D. R. JAMES
Technical Editor.....F. J. OLIVER
Art Editor.....F. J. WINTERS

o o o

Associate Editors

D. C. MacDONALD
S. H. BARMASEL
J. I. BUTZNER

Editorial Assistants

M. M. SCHIEN
G. B. WILLIAMS
G. P. BUTTERS

Regional News and Technical Editors

T. C. CAMPBELL
Pittsburgh 22
428 Park Bldg.

C. T. POST
Chicago 3
1134 Otis Bldg.

L. W. MOFFETT
Washington 4
National Press Bldg.

DONALD BROWNE
EUGENE J. HARDY
Washington 4
National Press Bldg.

T. E. LLOYD
Cleveland 14
1016 Guardian Bldg.

S. H. BRAMS
Detroit 2
7310 Woodward Ave.

OSGOOD MURDOCK
San Francisco 3
1355 Market St.

Editorial Correspondents

ROBERT McINTOSH
Cincinnati

C. M. PENLEY
Buffalo

G. FRAZAR
Boston

HUGH SHARP
Milwaukee

F. SANDERSON
Toronto, Ont.

R. RAYMOND KAY
Los Angeles

JOHN C. McCUNE
Birmingham

ROY M. EDMONDS
St. Louis

JAMES DOUGLAS
Seattle

Wanted—A Bond Holders' Protective Committee

IN normal times, bond buying is primarily done by people with larger than average incomes who choose this form of investment because of the safety of principal involved. In normal times, before the rubber dollar was invented the bond buyer who put a dollar into this form of investment had a reasonable assurance that he would eventually recover that dollar and in the meantime draw down a moderate rate of interest.

Prewar sales of stocks as compared to bonds ran about four or five to one as measured in market value. As for kinds of bonds bought, then, corporate bonds ran about five to one in demand as compared with government issues.

Today, as everyone knows, this picture has changed materially. Government bonds are today's best sellers and everybody and his brother and sister are buying them by the millions. Almost as many government bonds are being sold and bought every day as are pairs of shoes. And of course in market value, there is scarcely any comparison.

Bond buyers customarily put their purchases in safe places for protection, "where thieves cannot break in and steal." When these assets are threatened in value by more subtle influences, that vaults of steel and concrete cannot repel, bond holders' protective committees are appointed to protect the investors.

With the majority of American citizens buying government bonds today, it would seem as though these people could expect the administration to automatically become their bond holders' protective committee. And ostensibly, for publicity purposes, so it has been.

The able but ill-fated former head of OPA, Leon Henderson, for example, was the chairman of our first bond holders' protective committee. Unfortunately he had guts enough to collide with and stand up against certain powerful pressure groups with voting influence, to whose interest it was to blow some inflationary hot air into our hollow rubber dollar. So out went Leon.

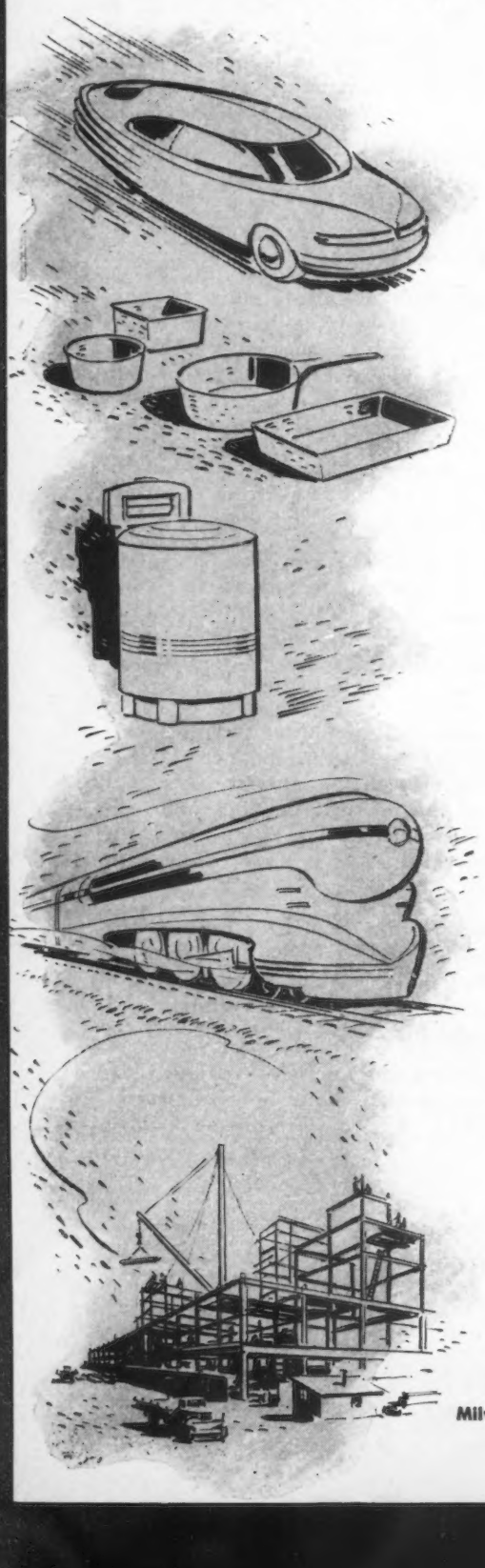
Chairman of our bond holders' protective committee today appears to be William H. Davis, chairman of the War Labor Board, who has just at this writing uttered a blast against the inflationary effect of wage rises. Unfortunately, because of the emasculating operation recently performed by Drs. Ickes and Lewis, this board is now as impotent to withstand strike pressures for higher wages as is a wet dishrag to stand up against a hurricane.

Coal has now opened the way for transportation, for steel, and for every other pressure group with potential fourth term voting power to blow more air into our hollow rubber dollar at the expense of the government bond buyer. And also at the expense of every buyer and holder of insurance, including the armed forces.

Where does that leave us? You answer that one. Perhaps our only protection may be to elect a real "honest to God" bond holders' protective committee on Nov. 7, 1944.

Design —

For Safety and Dependability With Inland Steel



The buying public has learned to associate steel with safety and dependability. People ride in steel trains over steel rails, live and work in structures made strong with steel, travel the highways in steel automobiles, cross streams on bridges of steel, farm and manufacture with steel equipment, use steel furniture and innumerable household appliances — all with the knowledge that these things, made of steel, cost less, are more durable — have greater strength and safety.

Steel affords strength without excessive volume and weight. It is strong in tension as well as in compression. It quickly recovers from strain, and is resilient under shock. Steel reduces fire hazard to the minimum, and is practically unaffected by climatic conditions. Steel normally resists corrosion and can easily be more fully protected against such action. Steel absorbs neither moisture nor odors.

Inland has been a leader in the development of steels to meet changing industrial requirements — has continuously cooperated with industry to make available various physical properties and surface textures that give steel its unsurpassed flexibility in product design and fabrication.

The Inland laboratories and the Inland staff of engineers and metallurgists are at your service to help you meet the design problems of today and of the post-war period. We will be glad to help you on any design, material selection or fabricating problems.

INLAND STEEL COMPANY

38 S. Dearborn St. — 50th ANNIVERSARY — Chicago 3, Illinois

Milwaukee Detroit St. Paul St. Louis Kansas City Cincinnati New Yor

The IRON AGE
NOV., 18, 1943

NEWS FRONT

• Post-war car models will probably have lower axle ratios which, though they sacrifice performance at low speed, bring startling gas economies. At 50 miles per hr., approximately 23 miles per gal. can be obtained with a 3.0 rear axle ratio, as against less than 16 miles at a 4.6 ratio.

• Other probabilities are: transmission cases, differential housings and cylinder heads of secondary metal aluminum castings; automatic transmissions; stiffer crankshafts; aircraft type bearings; pressure cooling; chrome plated piston rings; and a two-model system, one model for performance, the other for economy.

• Against normal productivity of 4,000,000 cars a year before the war, General Motors anticipates industry production for three or four post-war years around 6,500,000 cars annually.

• Residual copper and nickel in carbon steel heats has increased to an alarming degree in West Coast open hearths. Heats have been rejected even for ordinary rolling stock.

• The public declaration by Rear Admiral Cochrane, chief of the Bureau of Ships, that Puget Sound shipyards are overmanned, and the insistence by Army Supply Services that tank and truck assembly lines be moved across the mountains to provide additional facilities and workers for aircraft, has done more to clear the Pacific Northwest war production atmosphere than all the directives and expediencies applied to date.

• Proposals to relocate European heavy industry are being discussed in high government circles, with decentralization apparently the aim.

• Whether contract termination negotiations will remain under the Army or be shifted to the General Accounting Office will be decided by a sub-committee of the House Military Affairs Committee, which last week examined termination practice in the Chicago Ordnance District and accounting procedure at Detroit.

• The sub-committee is particularly impressed by Ordnance's technique of negotiating settlements, and will undoubtedly recommend continued Ordnance control over termination activities.

• Air cargo rates of 15c. a ton mile and a billion ton-miles of air cargo transport annually (1941 total: 5,250,000 ton-miles) were held out as feasible post-war potentials at the recent SAE air-cargo meeting.

• Military types of cargo and combat planes, which can serve the airlines officially only one or two years, tend to have relatively high wing loadings; will be expensive to reconvert, and compliance with stalling speed requirements will affect allowable operating weight. But, they must be utilized as virtually the only equipment immediately available at the war's end.

• According to a high naval transport official, for a 3000-mile flight, a flying boat could carry 50 per cent greater pay-load at 1/3 less cost than a land plane, but the land plane would arrive 5 hr. faster.

• Standard specifications for needled steels will probably specify base composition plus "sufficient intensifying addition" to enable the steel to meet specific physical property requirements. Ordnance has already adopted a number of tentative specifications of this type.

• Makers of the various proprietary addition agents are, in the light of current needled steel tests, working up recommendations for quantities and methods of use that will bring practically the same end result with use of any particular additive.

• A new method of impregnating magnesium castings with tung oil eliminates a large proportion of oil waste, saves time and results in a much larger proportion of castings passing impregnation tests. The oil is forced by direct pressure rather than by the autoclave vacuum process.

• Aluminum castings never have been tight, as aluminum goes, except for cylinder heads. Now all sand and permanent mold castings are short, as are many magnesium aircraft parts, and all permanent mold castings.

• Too little casting capacity is one reason. Serious manpower trouble in foundries is another. On the West Coast, aluminum and magnesium foundry turnover is 35 per cent a month. Overall, aluminum fabricating plants have a turnover double the national manufacturing average.

Development of the American Ti

THE application of tin coatings to various metals by hot dipping is an ancient art. About 1240 it was extended to tinning small iron plates in Bohemia, and around 1620 the art spread to Saxony but did not progress to any extent until 1665. An Andrew Yarranton eventually learned enough of the closely guarded secrets to make a beginning in England in about 1670. The Crown granted the rights and privileges of tin plate manufacture to a William Chamberlain in 1691, and by 1714-20 fair success was attained at Pontypool. Prior to this time, the industry had taken root in Alsace and Saxony, but the real development was to be in Wales in the counties of Monmouthshire, Glamorgan and Carmarthen.

Wales had been favored by nature for the beginning of such an industry, having the tin mines of Cornwall, abundant water power, and an industrious Welsh population. Significant progress was made when sheets were rolled in 1728, replacing the old method of hammering the base metal from iron bars. Credit for this accomplishment is given to a Major John Hanburys. In 1770 steam was substituted for water power and coke was used instead of charcoal in the production of the wrought iron base. Other important changes occurred in the methods of production; such as the invention of the pickling machine, the annealing pot and the mechanical coating of the plate. Siemens' steel was substituted for charcoal iron in 1875, and bessemer steel for puddled bar iron in 1880.

The growth of the industry in Wales was rapid. Table I shows the progression by plants and the approximate production in certain years. From the year 1750 to 1891 the number of plants increased from 4 to 80 while the number of mills represented by these works increased from 109 in 1858 to 525 in 1891.

The growth in the number of plants and mills testifies to the success of the Welsh tin plate industry, particularly during the last 16 years shown. This was largely due to the introduction of steel for use as a base material, which in turn permitted consider-

FIG. 1—Site of the first commercial production of tin and terne plate in the United States prior to the McKinley Tariff Act. This plant was erected for the American Tin Plate Co., Wellsville, Ohio, in 1873-74. Tinning was discontinued in 1874 and in 1880 the plant was purchased by the Wellsville Plate & Sheet Iron Co., later being acquired by the American Sheet & Tin Plate Co.

o o o

Tin Plate Industry

By HOWARD A. KNOX
Assistant to Manager of Sales, Tin Plate Division, Carnegie-Illinois Steel Corp.

. . . The history of an industry cannot be fully recorded while it is still active. The purpose of this article is to present a general perspective of the progress of the American tin plate industry, its discouraging beginning, its subsequent success in the latter part of the nineteenth century and its status at the present time. In this first part of a three-part article, the author discusses the early history of tin plate and its development in Wales, American attempts to produce tin plate and the period immediately following the passage of the McKinley Tariff Act of 1890.

able technical progress in tin can and utensil manufacturing. While the technical changes occurring in the latter part of the eighteenth century made very definite contributions to the industry, its true strength was largely due to the inherent skill of the Welsh people.

Whole families worked in the mills. Boys started to work at an early age and grew up in the trade. The industry was greatly decentralized and production secrets were carefully guarded and largely confined to family groups. This decentralization and ultra-clannishness did not contribute to the Welsh tin plate makers' recognition of the fact that while a state of monopoly had been attained, Wales was dependent upon the United States as an outlet for about 70 per cent of its total production, and no concerted action was taken to anticipate a change in this situation. The forces that had already established America as an industrial world power were ignored.

Imports of tin plate by the United States from Wales had skyrocketed from 93,000 net tons in 1871 to 367,000 net tons in 1889, but it took the McKinley Tariff Act, which was passed by the Congress of the United States in 1890, to awaken the United Kingdom to the realization that its tin plate industry was in a most precarious position, not only from the standpoint of losing its largest market, but because a universal competitor was in prospect.

Early American Attempts

Early efforts to establish a tin plate industry in the United States were rather feeble in contrast to the success of the Welsh during most of the nineteenth century. All tin plate was imported, and it had never been subjected to duties as was the case on other iron and steel products being manufactured in the United States. A duty of 0.5c. a lb. was imposed on tin plate by the Act of 1862 and retained until 1864, becoming 2.5c. a lb. at that time. Unfortunately, the increase was never actually put into effect.

There must have been some earlier efforts to establish an industry since it is alleged that as early as 1830 in a shop on Market Street, Philadelphia, English tin plate was dipped into a pot of molten lead to produce a dull-appearing plate which was designated as terne plate. This plate was produced as a roofing material, and its worth was readily established. The process, however, promptly reached Wales for more favorable production.

It also is reported that the first actual tin plate made in America was produced at Hussey's Copper Works, Pittsburgh, in 1858-59, by one John Grey, the manager of that establishment, the black plate being produced at the Sligo Rolling Mills, Phillips, Nimick & Co., built in 1825 on Pittsburgh's South Side. In 1875 a tariff rate of 1.1c., which was about equal to 20 per cent of the prevailing Welsh price, was put into effect and as a result, in 1872-74 three rolling mills with tinning equipment were built and operated. They were the Rogers & Burchfield Co. at Leechburg, Pa., the United States Iron & Tin Plate Mfg. Co., at Demmler, Pa., and at Wellsville, Ohio, a concern referred to as the American Tin Plate Co. (not the company of "trust" fame).

A decline in the price of Welsh plate caused the latter company to discontinue tinning in 1874, the Leechburg mill in 1875, and the Demmler plant in 1877. The effect of the reduction in price might have been withstood to a degree except for the fact that there was a marked lack of technical information and an absence of skilled labor in this country, and that the rather limited steel production did not permit favorable costs to match those of the United Kingdom. There was another change in the tariff in 1883, when a duty of 1c. a lb. went into effect, but no production was attempted since this duty was strictly of a revenue rather than of a protective nature.

A great deal of this nation's commerce centered about the Eastern seaports, and it was a daily sight to see thousands of wooden boxes of tin plate on the docks of many ports. This was particularly true of Baltimore, which was the leading city both in the manufacture of cans and the packing of food. Canned food was, then as now, a basic requirement for an industrial nation such as the United States, and dependency upon others for material was viewed with concern by statesmen and industrialists alike. William McKinley was one of the nation's strongest advocates of the idea that the enlarging demand for tin plate from the can industry and other users should be satisfied by American producers. Over 7,400,000 base boxes, valued well in excess of $33,000,000, reached this country in 1889, but that year marked the end of the balmy years for Wales since an enterprising America caused the Congress of the United States to enact the McKinley Tariff Act in 1890, giving a protection of 2.2c. a lb. against imported tin plate.

The McKinley Tariff Act is an outstanding example of timely legislation designed to protect an infant industry so long as the industry could progress. The act contained a provision that the duty would be removed entirely if the American industry

failed to produce a certain amount of plate by June 30, 1897, namely that the amount of tin plate produced in any one year between July 1, 1891 and June 30, 1897, had to equal one-third of the plate imported during any fiscal year of this period. If this provision was not met, protection was to cease.

Here was a challenge to American industry that was readily accepted. It is a misconception for anyone to attribute the beginning of the tin plate industry in this country to the McKinley Tariff Act. This protective tariff hastened its start, but it was inevitable that American ingenuity and steel-making resources would have eventually accomplished the same results at some later date.

New Plants Stimulated

The McKinley Tariff Act was not operative until July, 1891, but during 1890 a number of tinning plants began to appear. Mills rolling light gage sheets hastily installed tinning equipment and other rolling mills were built with the necessary finishing facilities. Approximately 20 plants began operations in 1891, with 10 more under construction. Due to the lack of sufficient domestic black plate, a considerable tonnage was imported from Wales, in fact about 30 per cent of the tin and terne plate produced in 1891-92 was made from foreign black plate.

The location of the early tin plate concerns was influenced by the possibility of supplementing existing rolling mill equipment with tinning facilities, a source of semi-finished steel for rolling, the existence of fuel and labor, or existing consumers such as a can manufacturing or stamping enterprise. Certain Atlantic Seaboard companies who had been importing tin and terne plate looked upon American manufacture as a substitute. Areas of consumption had to be considered.

Although not entirely accurate, general geographic classifications may be established from the basic reasons outlined. Pittsburgh, western Pennsylvania, and the eastern Ohio areas had rolling mills producing sheets, a supply of semi-finished steel, labor and fuel. The Atlantic Seaboard had former importers and was a large consuming area. The Middle West had a plentiful supply of natural gas and was adjacent to the packing sections of Indiana and Illinois. Both the East and Middle West had their existing fabricators of tin plate. The concerns coming within these geographical locations, with supplementary notes, are as follows:

PITTSBURGH, WESTERN PENNSYLVANIA AND EASTERN OHIO AREA: It was with pride and satisfaction that the community of Demmler, Pa., saw its mill, the United States Iron & Tin Plate Mfg. Co., industriously start producing tin plate in 1890, undoubtedly with some of the equipment which it had been forced to shut down 13 years before.

John Hamilton, Pittsburgh, was one of the first to buy black plate locally, in 1890.

Laufman Tin Plate Co. built a plant in 1890 at Butler Junction, Pa., buying black plate from the Apollo Sheet Iron Mills, P. H. Laufman & Co., Ltd., Apollo, Pa.

Apollo Sheet Iron Mills, Apollo, Pa., added tinning equipment to their rolling mill in 1891.

C. W. Cadwallader, Pittsburgh, installed tinning equipment in 1891.

Wallace Banfield Co., Irondale, Ohio, added tinning equipment to its rolling mill in 1891.

New Castle Steel & Tin Plate Co., New Castle, Pa.—1892-93.

Aliquippa Tin Plate Co., Aliquippa, Pa.—1892.

Blairsville Rolling Mill & Tin Plate Co., Blairsville, Pa.—1892.

Pittsburgh Tin Plate Works, New Kensington, Pa.—1891-92.

James B. Scott & Co., Allegheny City, Pa. (Pittsburgh), did tinning only—1891-92. This concern later became the Follansbee Brothers Co.

Monongahela Tin Plate Co., South Side, Pittsburgh, at 13th Street and P&LE Railroad—1893.

Record Mfg. Co., Conneaut, Ohio, bought black plate for tinning for use in its can manufacturing business—1891-92.

Britton Rolling Mill Co., Cleveland, Ohio, added tinning equipment to its rolling mill in 1893.

EASTERN AREA: Iron Clad Mfg. Co., Brooklyn, N. Y., installed equipment in 1890 to tin black plate for its own consumption of stampings although the company had been tinning manufactured ware since about 1876.

Cumberland Steel & Tin Plate Co., Cumberland, Md., in 1891 was one of the earliest sheet mills to supply black plate to the numerous Eastern tinning establishments that came into existence after the McKinley Tariff.

Penn Treaty Iron Works, Marshall Brothers, Philadelphia, in 1891 added tinning facilities to their rolling mill.

N. & G. Taylor Co., Philadelphia, which for years had been identified with manufacturing tin and terne plates in Wales, moved its equipment to America in 1891, installing the equipment in Philadelphia. In 1899-1900 the company built its own rolling mill at Cumberland, Md., which eventually was purchased by the Republic Steel Corp.

Baltimore Tin Plate Co., Locust Point, Baltimore—1891-92.

Matthai, Ingram & Co., Baltimore—1892. Later owned and operated by the National Enameling & Stamping Co., St. Louis.

American Tin & Terne Plate Co., Philadelphia. Installed tinning facilities in 1891-92.

Somers Brothers, Brooklyn—1892.

Phillips Tin Plate Co., Inc., Philadelphia, established tinning facilities in 1892.

Norristown Tin Plate Co., Norristown, Pa.—1892.

Merchant & Co., Philadelphia, installed tinning equipment in 1893.

Philadelphia Iron & Tin Plate Works; Hughes & Patterson, Inc., Philadelphia, added a tinning plant to its rolling mills in 1893.

MIDDLE WESTERN AREA: St. Louis Stamping Co., St. Louis, large

TABLE I
Growth of the Welsh Tin Plate Industry 1750 to 1891

Year	Number of Works	Year	Number of Mills	Year	Approximate Production In Base Boxes*
1750	4	1858	109	1875	3,000,000
1800	6	1868	171	1887	11,000,000
1825	16	1878	218	1891	13,000,000
1850	34	1881	389		
1860	40	1891	525		
1865	47				
1870	50				
1875	75				
1891	80				

*A base box is an area of 218.78 sq. ft. (31,360 sq. in.) or the equivalent area of 112 sheets—14 in. x 20 in.

fabricators of tin ware, added tinning equipment to its Granite Iron Rolling Mills in 1890. This concern was later known as the National Enameling & Stamping Co., and today as the Granite City Steel Co.

American Tin Plate Co., Ellwood, Ind.—1891-92. This plant was one of the largest and was the first complete tin mill constructed.

Morewood Co., Gas City, Ind.—1893.

Indiana Tin Plate Mfg. Co., Atlanta, Ind.—1892-93. Later became the Atlanta Steel & Tin Plate Co.

Norton Brothers, Maywood, Ill., built a tinning plant in 1891 to produce tin plate for their own consumption in can manufacturing

W. T. Simpson & Co., Cincinnati—1891. Later the American Galvanizing & Tin Plate Co. in 1900.

Cincinnati Corrugating Co., Piqua, Ohio, bought black plate from the Piqua Rolling Mill Co. and began tinning in 1891.

o o o

FIG. 2—Trade mark of the American Tin Plate Co., Ellwood, Ind., 1891. The American eagle carrying the British lion symbolizes the replacement of Welsh tin plate by the American product.

o o o

Welsh Labor Used

It was only natural that during the first few years of manufacture in this country the industry was forced to rely upon Welsh methods and labor to a considerable extent. One of the greatest obstacles to overcome was the breakage of equipment, most of which had been imported from Wales. It was a real innovation when American engineers increased the diameter and length of hot mill rolls. Greater heat radiating efficiency was secured and more pressure could be exerted in reduced the packs* to longer lengths, and with the larger rolls it was possible to maintain a more uniform and constant temperature. The best indication of the progress in this period is found in a record of domestic production as contrasted with tin plate imports. Production in this country was approximately 1118 net tons in 1891 as contrasted to importation from Wales that year of 516,766 net tons, but in 1892 output had reached 21,060 net tons. Conditions in this country during that year did not warrant an importation from Wales greater than 210,919 net tons. The close of 1893 saw the domestic tin plate output of the year before almost tripled, resulting in a tonnage of 61,803 net tons against imports of 314,048 net tons. There was still plenty of room for more productive capacity since America's needs were far from being adequately met.

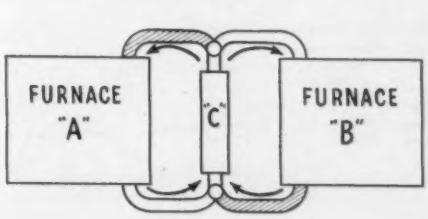
**The black plate for tinning was hot rolled from bars into two sheets which were doubled and redoubled with intermittant heating and rolling.*

Ed. Note—Next week the author continues with a discussion of the period of competition and subsequent combination and corporate expansion. The effect of improved can design on the expanding use of tin plate is also described.

Gas Cooler Improves Furnace Operations

TO insure better control of annealing, drawing, tempering, and stress relieving operations, the Brown Fintube Co., Elyria, Ohio, designed a new finned tube gas cooler. The cooler consists of a bank of resistance-welded integrally-bonded extended surface fintubes, welded to headers at each end and mounted in an insulated steel housing. Water for cooling passes through the inside of the tubes, while the gases to be cooled are passed between the outside of the tubes and the unit housing.

The cooling units are used in conjunction with two furnaces, as shown in Fig. 1. The hot gases are withdrawn from furnace A at temperatures ranging from 1200 to 1600 deg. F., while this furnace is on the heating cycle, and are passed through the cooler which reduces their tonnage to any desired level. These cooled gases are then passed into furnace B, and by careful temperature control of the cooled gases, the work in furnace B can be annealed, drawn, stress relieved, etc., at exact temperature that will produce desired physical qualities. After furnace B has been recharged and put back to heat, the cycle is reversed and the material in furnace A goes through the secondary cycle.



Advantages claimed for the furnace gas cooler are, in addition to temperature control in annealing, stress relieving, and drawing, that time cycles are greatly reduced by speeding up the cooling cycle and there is absolute control of furnace atmosphere assuring a minimum of oxidation.

Producing Tubular Railway Axles

. . . Tubular railway axles offer greater physical strength and increased resistance to wear at the journals as well as substantial savings in weight over solid axles. The procedure of the Pittsburgh Steel Co. in making these axles and the results of experimental tests are herein described.

FOLLOWING several years of development work, the Pittsburgh Steel Co. has completed an addition to its Allenport, Pa., plant devoted to the production of tubular railway axles. The new product represents one of the few major developments in railroad rolling stock design of recent years.

The plant, which has a capacity of 500 axles a day, involves novel features in design and has made full use of production line methods. While the patented process and tests were completed three years ago by engineers of the Pittsburgh Steel Company with the cooperation of the Urschel Engineering Co., the difficulties of constructing a new plant not directly devoted to military materials under war conditions delayed putting the project into operation until the present time. During this period, however, some axles produced on an experimental basis have been in actual railroad service.

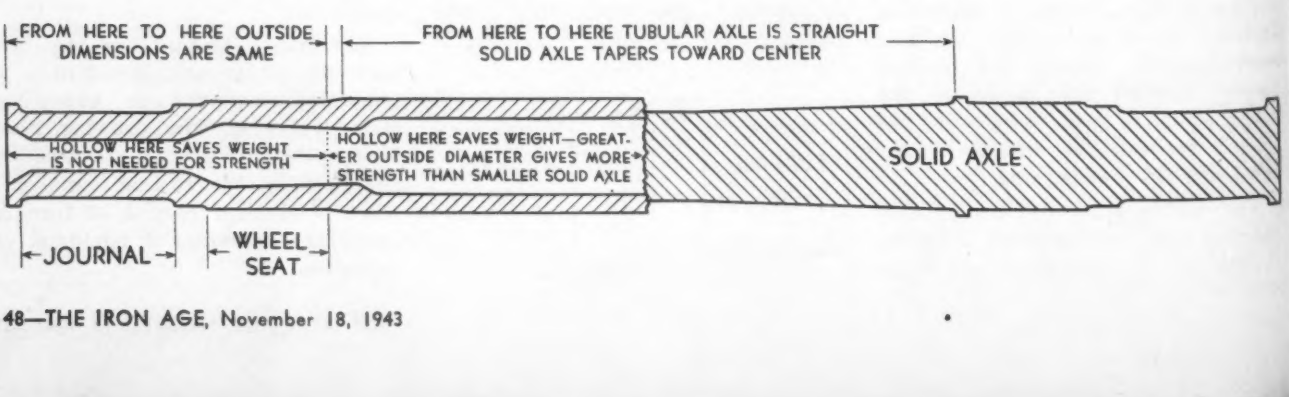
The new plant, which uses seamless tubing as its material, adjoins the company's Pilger mill which supplies the tubing cut to suitable sizes. The Pilger process is a unique method of producing seamless tubing. After cylindrical billets are pierced, the rolling process differs fundamentally from the usual method of completing the tubes. The rolls used to form the tubing are elliptical and they rotate in a direction opposite to the feed of the steel which is pressed against the rolls by a ram. The steel is fed forward by the ram when the pass between the rolls is wide. As the pass narrows, the rolls produce an effect similar to the blows of a forging hammer. The inside diameter of the tubes is maintained by the use of a mandrel. The resulting product has the superior qualities which naturally result from a forging operation in comparison to a rolling operation.

After being cut to suitable sizes, the tubes are taken to the axle plant and are passed through a continuous tube end heating furnace which heats one end of each tube. The heated ends then are upset in a tube upsetting press and the ends are then shaped to form the journals and wheel seats of the axle by a 3000 lb. drop hammer.

Following this operation, the tubes are returned to the heating furnace, and the opposite ends are heated, upset and forged. In normal operation, each alternate tube is new material while the adjoining pieces are going through the process for the second end.

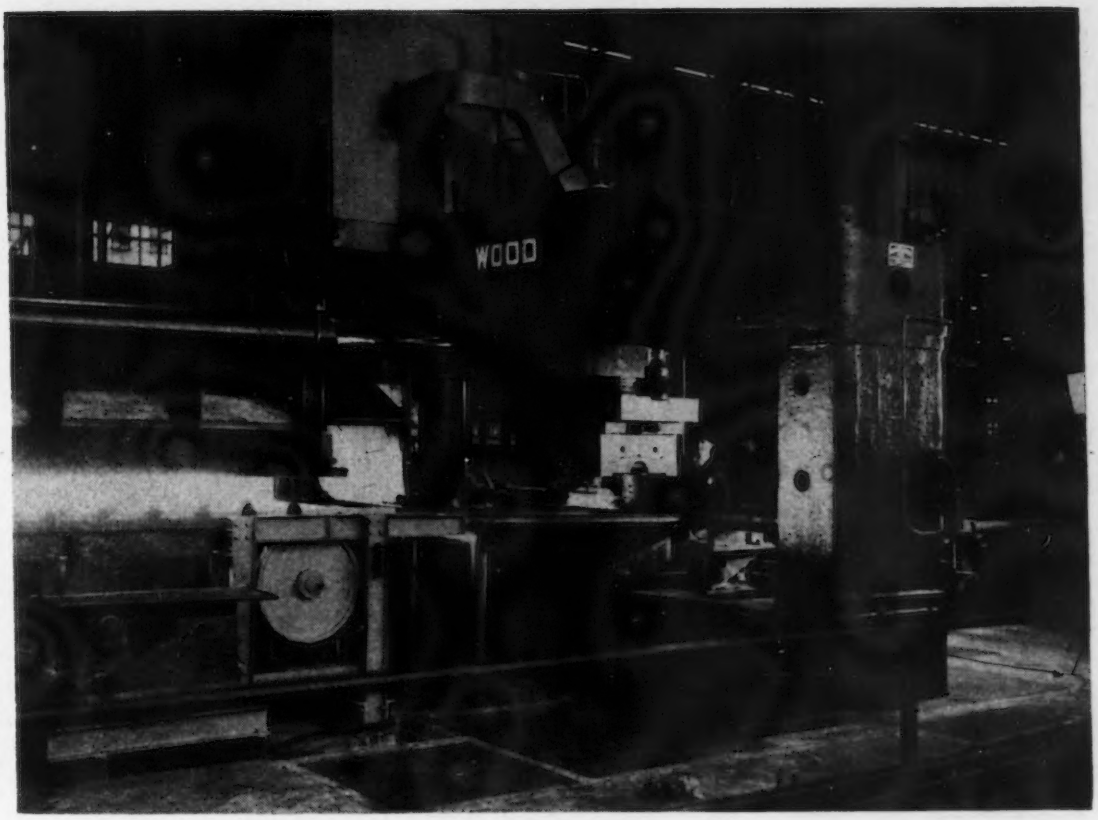
The axles which have been finished at both ends then pass to a continuous hardening furnace, and after emerging, they are straightened and quenched. The straightening and quenching equipment is so designed that the ends of the axles are plugged, and quenching takes place only on the outside.

Fig. 1.—Comparison of solid and tubular axles for a 5½ x 10 in. journal.


FROM HERE TO HERE OUTSIDE DIMENSIONS ARE SAME
FROM HERE TO HERE TUBULAR AXLE IS STRAIGHT SOLID AXLE TAPERS TOWARD CENTER
HOLLOW HERE SAVES WEIGHT IS NOT NEEDED FOR STRENGTH
HOLLOW HERE SAVES WEIGHT—GREATER OUTSIDE DIAMETER GIVES MORE STRENGTH THAN SMALLER SOLID AXLE
SOLID AXLE
JOURNAL
WHEEL SEAT

RIGHT

FIG. 2 — Material for tubular axle production consists of seamless tubes produced in the adjoining Pilger mill. After heating in a continuous tube end heating furnace, the first operation consists of upsetting. The heated end of each tube is held in a die while the press strikes the end to increase the internal diameter.



BELOW—RIGHT

FIG. 3—After upsetting, the journal and wheel seat are forged by a 3000-lb. drop hammer. Following completion of one end, the axles are returned to the heating furnace by a conveyor and the opposite end is processed. In normal operation, each alternate axle is having the second end finished.

Following quenching, the axles are passed through a forced convection draw furnace and then go through a cooling tank. In a final operation, the insides of each end are simultaneously machined to exact centers on a special machine and are ready for shipment.

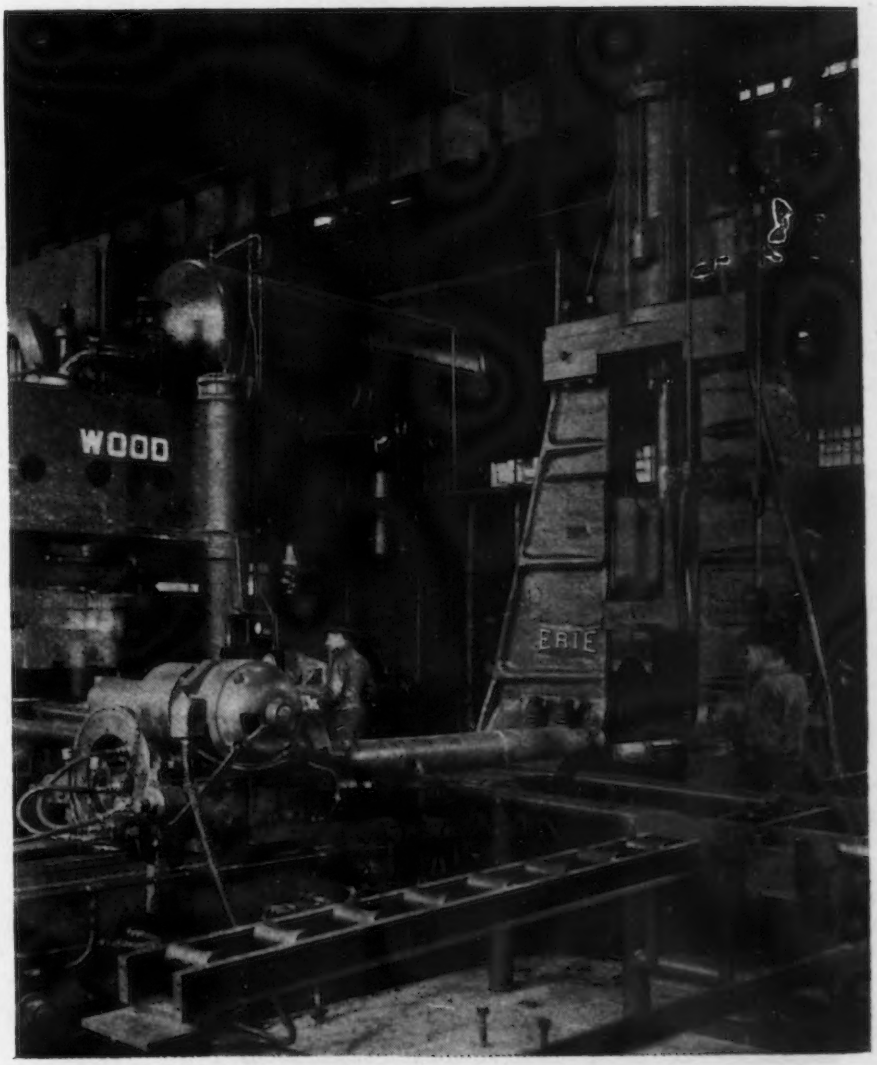
Axles Interchangeable

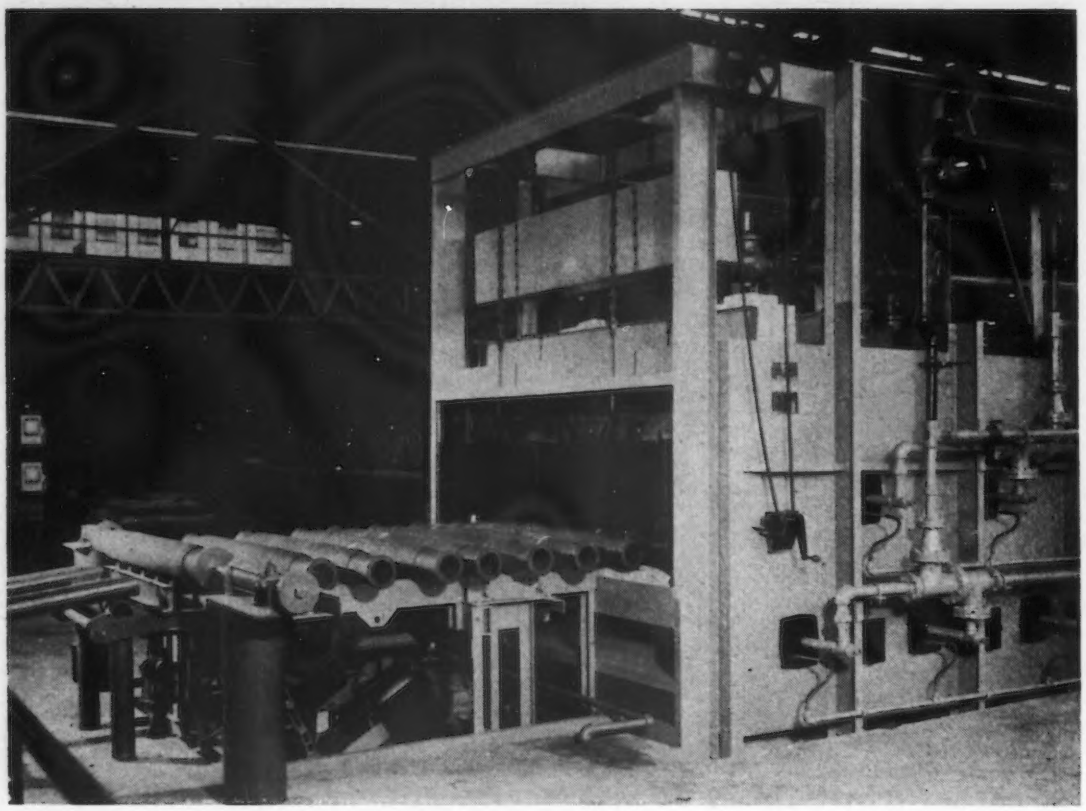
The axles are designed to be machined to the same journal and wheel seat dimensions as the conventional type of solid axles. They are completely interchangeable with solid axles and can be machined on the usual types of lathes with the addition of suitable fittings for centering the tubular material.

Between the wheel seats the axles are straight and are left with the natural finish produced by the Pilger mill operation. The only difference in the outside dimensions is in the portion between the wheel seats, since the tubular axles do not have the fillet and the subsequent taper toward the center, which is typical of solid axles.

The relative shapes as well as the inside contours of the tubular product are shown in Fig. 1 which compares halves of tubular and solid axles.

Substantial savings in weight result from the use of the new product as well as greater resistance to distortion and greater fatigue resistance. The saving in weight per axle, as shown in Table I, varies from 177 lb. on axles with 5x9 in. journals to 510





LEFT

FIG. 4—The formed axles are heat treated in a continuous hardening furnace.

o o o

BELOW

FIG. 5—After passing through the hardening furnace, the axles are straightened and then are quenched in a specially designed machine. In quenching the ends are plugged so that quenching takes place only on the outside.

lb. on axles with 6½ x 12 in. journals. These savings in weight range from 25.1 per cent to 42.8 per cent.

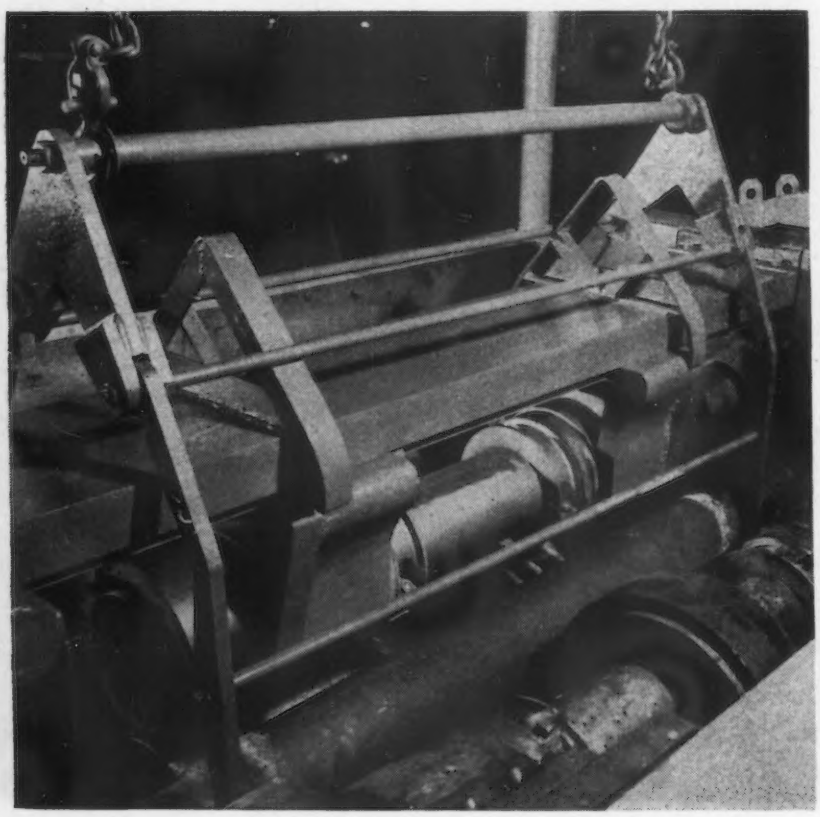
Railroad operating officials report varying estimates of the cost of hauling one ton of dead weight per car per year on the basis of 10,000 miles of operations a year. These estimates range from $12 to $18 per ton per car per year. Assuming an average cost of $15 per ton per car per year for hauling dead weight, the savings would range from $7.53 for 40-ton cars equipped with 5x9 in. journals to $15.30 per car for 70-ton cars with 6½x12 in. journals.

The saving in unsprung weight also materially reduces rail hammer and may be expected to result in a substantial ultimate saving in maintenance of way expenses when a sufficient number of cars become equipped with tubular axles.

More important than this, however, is the saving in maintenance cost to be secured through longer life of the tubular axles with far less frequent replacement.

Two types of tests were employed on the axles. The first part consisted of distortion or bending tests to determine stiffness under various loads. In these tests, collars were fitted on the wheel seats with the same tolerances with which wheel press fits are made. It was found that the deflection of tubular axles was less than that of solid axles under equivalent load. In the solid axles, failure through permanent distortion began at 169,000 lb. and continued as the loads were increased. Actual yield occurred at 225,000 lb. to 226,000 lb.

For tubular axles, loads of 369,600 to 431,000 lb. were required to set the structures permanently. This indicated 56 per cent greater strength for the tubular axles over the solid axles before plastic deformation developed.



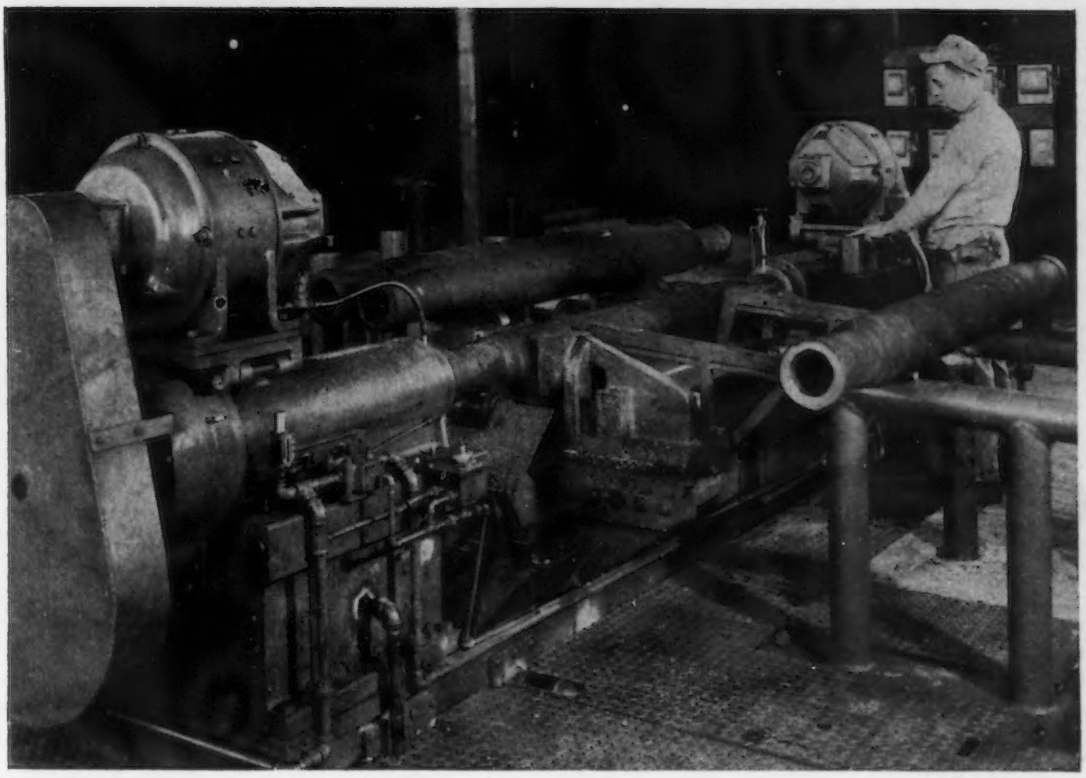


FIG. 6 — Following quenching the axles pass through a forced convection draw furnace and a cooling tank. In the final operation the ends are simultaneously machined to centers.

Fatigue tests were conducted at the physical testing laboratory of the Timken Roller Bearing Co. with the axles loaded on the basis of 19,000 lb. breaking stress at the wheel seats. The tubular axle withstood over 88,000,000 stress reversals which was equivalent to 155,000 miles on 36 in. wheels, without failure. Similar tests with solid axles at 19,000 lb. break stress resulted in failure at the wheel seats at 875,000 to 2,755,000 stress reversals.

TABLE I

Comparative Weight of Solid and Tubular Axles

Journal Sizes, In.	Weight Solid, Lb.	Weight Tubular, Lb.	Weight Reduction, Lb.	Weight Reduction, Per Cent
5 x 9	705	528	177	25.1
5½ x 10	835	575	260	31.1
6 x 11	1,015	632	383	37.7
6½ x 12	1,190	680	510	42.8

The greater physical strength of the tubular axles is attributed to several factors. First, the greater external diameter between the wheel seats provides greater strength than the solid axles. Second, the tubular material, as produced by the Pilger process, is a forged product with the usual physical benefits conferred by forging. Third, subsequent heat treating further improves the physical characteristics. The heat treatment also makes the tubular axles less subject to wear at the journals.

A further advantage has been found, according to studies made by plant engineers, in that tubular axles run cooler which should prove a factor in making them less susceptible to wear and to some types of hot boxes. Comprehensive data on this point cannot be secured until large numbers of the axles have been in service for some period of time.

In addition to laboratory tests, numerous axles produced on an experimental basis have been in actual service on railroads for several years. In one of these service tests, tubular axles and solid axles were placed on the same trucks of heavy dump cars used on the Monessen & Southwestern Railway. Considerably less wear was found on the tubular journals than on solid journals especially endwise after identical periods of service.

Protective Skin for Plated Surfaces

WHAT is said to be a new and effective method of lastingly protecting zinc and cadmium surfaces against corrosion through the application of a new coating, Iridite, has been developed by Rheem Research Products, Inc., Baltimore, a subsidiary of the Rheem Mfg. Co.

Iridite, is a chemical coating applied to zinc and cadmium surfaces. Simple to use and low in cost, Iridite, according to the Rheem, is literally "soaked up" by the plated metal, becoming an integral part of it. It will not flake off or chip. The color is olive drab. The protective skin provided by Iridite is extremely thin, and under ordinary conditions 100 gal. of Iridite solution will coat 20,000 sq. ft. of work. Plated parts are treated with the Iridite by dipping them in a proper solution for from 10 to 60 sec. and then immediately rinsing in hot water to facilitate drying.

The only equipment needed for applying the coating, which despite its extreme thinness is not impaired by bending, forming or twisting, is an acid-proof container for the Iridite solution and a container for the hot water rinse. A temperature of from 75 deg. to 100 deg. F. is used for the solution, the exact temperature depending upon the work to be done. Iridite must not be used to protect containers for edible products.

Chrome Ore and Chrome Magnesite

By J. H. CHESTERS

Central Research Department, United Steel Companies, Ltd., Stocksbridge, England

. . . Concluding his two-part article, the author discusses the manufacture of chrome and chrome magnesite brick and its properties and applications, as well as those of other composite refractories containing chrome. Last week, the distribution, properties, condition and preparation of chrome ore were investigated.

At one time, straight chrome brick made by grinding chrome ore with water and possibly a little gum, molding, drying and firing, was one of the principal steel plant refractories. Very little straight chrome brick is used today, it being usual to add at least 10 per cent of magnesia to the batch.

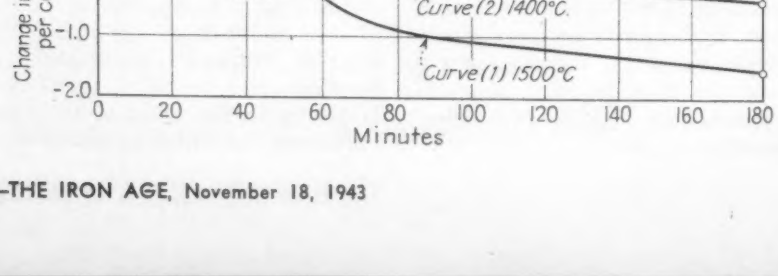
When straight chrome brick is made, considerable difficulty is experienced due to softening during firing. To avoid distortion, the bricks are often boxed with silica brick, which makes the production of the chrome brick rather expensive. Moreover, such brick has a low refractoriness under load failpoint (2550 deg. F. under 50 lb. per sq. in.), after they are fired. Both these difficulties can be overcome if sufficient magnesia is added to the batch to react with the serpentine or other gangue material to yield forsterite. Even unfired chrome brick usually contain such an addition together with a chemical bond which gives them a high green strength.

Chrome bricks show a shrinkage on firing characteristic of refractory batches consisting of a relatively inert 'grog' surrounded by a fusible matrix. Fig. 8 shows the type of curve obtained when the firing shrinkage is measured continuously. As with magnesite brick, the after-contraction obtained on fired chromite brick is simply a continuation of this firing shrinkage.

Heindl has shown that certain types of chrome ore, when heated in a reducing atmosphere, show an abnormal expansion at comparatively low temperatures (Fig. 9). It is doubtless this reaction which is responsible for the crumbliness of both chrome and chrome magnesite brick made from these ores. With chrome magnesite bricks, which normally have a strength of about 3000 lb. per sq. in., the use of such ores may lead to bricks having a strength of 1000 lb. per sq. in. or less and a porosity of 30 per cent or more. Such bricks are not considered satisfactory if only because they do not possess adequate "edge-strength" and conseqeuntly suffer serious damage in handling.

The mechanism of the reaction has been the subject of a great deal of research, but the results have not yet been released for general publication. One point, however, is clear, those ores which contain free iron oxide as received, or are readily oxidized on firing (when they become strongly magnetic), are among the most susceptible to this type of failure.

Fig. 8—Continuous firing shrinkage curves for Cuban chromite test pieces.



Chrome-Magnesite Brick

The chrome-magnesite brick used today is a relatively recent development. A number of workers in Germany, America and Great Britain developed at approximately the same time brick of a similar type (70-30 chrome-magnesite) having properties much superior to those of straight chrome brick. Not only did they possess a much higher refractoriness under load but, if suitably graded, they showed a very high thermal shock resistance.

The most usual procedure is for the

70 per cent of chrome ore to be of approximately 7-25 B.S.S. mesh (8-28 Tyler mesh) and the 30 per cent of magnesite to be all in the fine fraction—through 72 mesh. B.S.S. (65 Tyler mesh.) Other combinations having these properties can be used, but the above is by far the most usual batch composition.

The brick may be either chemically bonded and used unfired or may be fired in the normal way. Further, it may be made by hand-molding or, more usually, in a hydraulic press or hammer machine. The effect of the grading on the thermal shock resistance is shown in Fig. 10. It will be seen that the highest thermal shock resistance was shown by the coarser mixtures. An increase in the percentage of fine (and to a lesser extent of medium) material, resulted in a much lower thermal shock resistance.

The drying of chrome-magnesite brick does not present the difficulty experienced with straight magnesite, since the chrome ore is inert to moisture and the proportion of magnesia is relatively small. The firing treatment varies very considerably from one plant to another, the finishing temperature being as low as 2460 deg. F. or as high as 3000 deg. There is little doubt that a high firing temperature is advantageous, since it simulates the furnace conditions without resulting in any serious loss in thermal shock resistance. One fortunate feature of these bricks is that the fired length is close to that of the mold size and hence no allowance for firing shrinkage or expansion need normally be made. Preliminary heat treatment of the chrome ore, either alone or with magnesia, has been advocated but is not employed in Great Britain.

If the chrome-magnesite ratio differs from the 70-30 composition given above, either towards the magnesite or chrome end, the same degree of shrinkage compensation (or expansion) is not obtained. The results given by a series of laboratory test pieces are shown in Fig. 11. If the amount of magnesite required to convert serpentine associated with the chrome to forsterite is calculated, it will be found to be only about half of that actually employed. It is not surprising that this should be the case when it is realized that the magnesia is solid throughout the reactions and is unlikely to come in contact with all the serpentine present.

The changes occurring during the manufacture of chrome-magnesite brick are not limited to the conversion of the serpentine to forsterite. That some reaction occurs between the magnesia and the chrome ore can readily be shown by using electrically fused magnesia, which starts as a colorless crystalline material and finishes with a reddish-brown tint which is strongest on the outer surface and disappears towards the center of the grain.

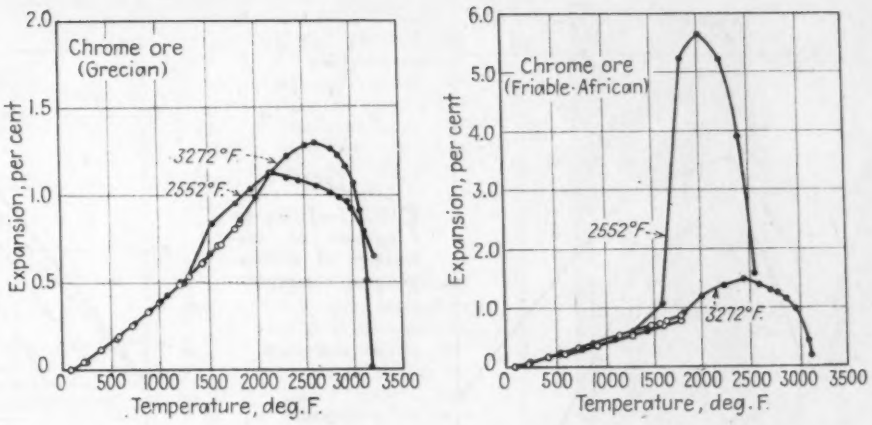


FIG. 9—Thermal expansion of Grecian and friable African chrome ore. The temperatures adjacent the curves indicate the maximum heat treatment the specimen had received prior to testing. Black and white dots indicate tests made in reducing and oxidizing atmospheres respectively.

Chemical analysis of magnesia grains removed from such mixtures shows them to contain traces of iron oxide and chromic oxide. A considerable amount of work has been done by Trostel and other workers, but there would still seem to be some doubt as to the mechanism of the reactions which occur. One thing, however, is clear; the spinel does take part in the reaction and is not the stable and inert material that it was once considered to be.

Some use has been made, particularly in Germany, of brick containing 20 to 40 per cent of chromic oxide prepared by fusing various slags, for example, those from ferrochrome production, and casting them in the form of blocks. Sittard gives the composition of the remainder as alumina 25 to 40 per cent, magnesia 18 to 30 per cent, miscellaneous oxides 8 to 14 per cent. Such blocks have been found to give good service in the ports and in the front and back walls of basic open-hearth furnaces, but their high price is likely to hold back their more general adoption. Patents have also been taken out for other synthetic cast refractories, for instance, those made from aluminachromic oxide batches.

Chrome and Chrome-Magnesite

Properties of chrome and chrome-magnesite brick have already been discussed in connection with the ports

o o o

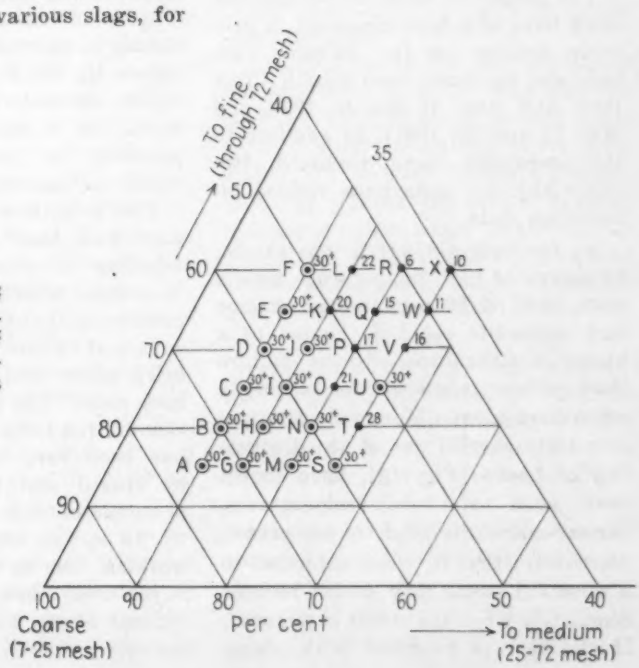
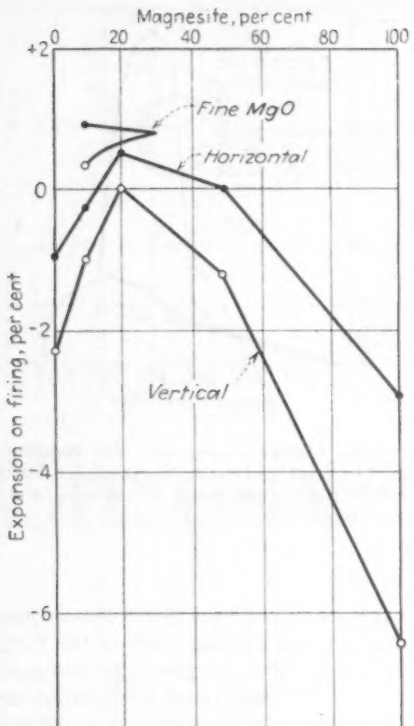


FIG. 10—Influence of grading on the thermal shock resistance of 75/25 chrome/magnesite brick B.S.I. sieves used.

o o o

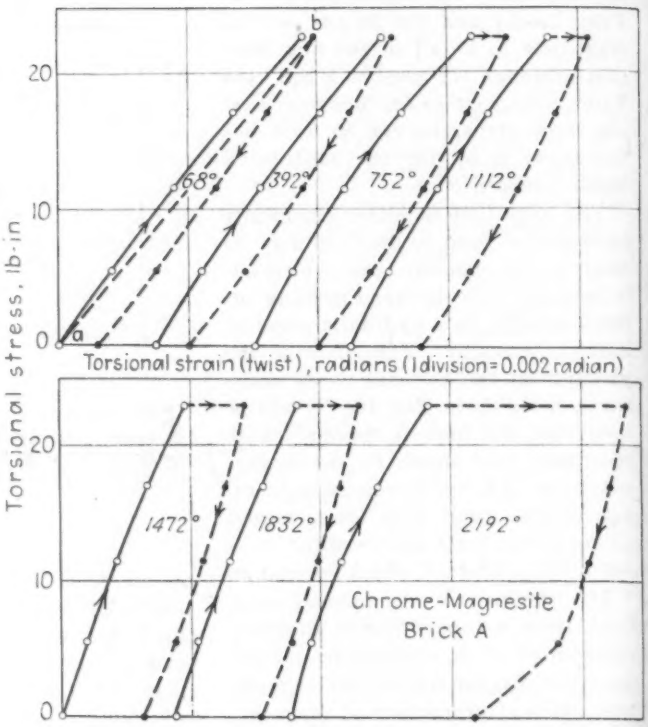


LEFT

FIG. 11—Firing expansion or contraction of chrome-magnesite mixtures.

RIGHT

FIG. 12—Effect of stress application and release on chrome - magnesite test pieces at temperatures up to 1200 deg. F. Note permanent set even in the cold.



of acid open-hearth furnaces. (THE IRON AGE, May 28 and June 4, 1942). As already mentioned, such brick is characterized by its low refractoriness under load and relatively low thermal shock resistance. Though these limitations have been largely overcome in the more modern product, their principal advantage is still their relative inertness in contact with both magnesite and silica.

The properties of chrome-magnesite brick have also been discussed in previous articles on the all-basic furnace and the basic open hearth (THE IRON AGE, Aug. 15 and 22, 1940, and May 22 and 29, 1941). In addition to the properties there discussed, two other physical tests have yielded interesting data.

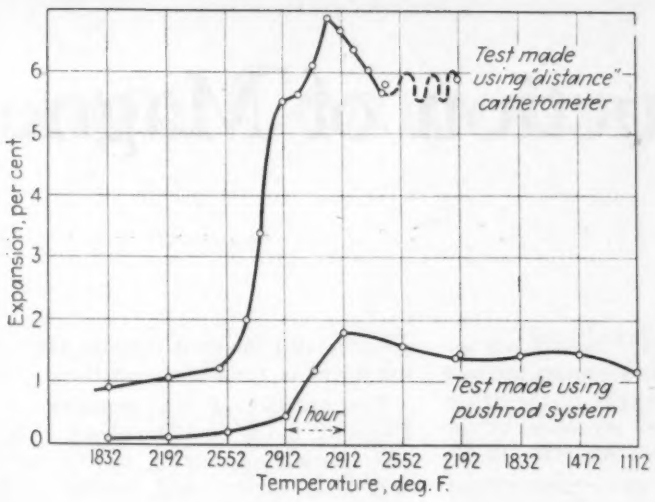
As far back as 1931 it was shown, by means of high temperature tensile tests, that 50/50 mixtures of chrome and magnesite could be heated to a higher temperature without failure than either magnesite or chromite when used alone. More recently, torsion tests carried out at the University of Leeds (Fig. 12), have shown that even at low temperatures, chrome-magnesite brick do not behave elastically; that is, when subjected to a torsional stress they do not recover completely when the stress is removed. If the test is repeated with rising temperature, it is found that the amount of the permanent set increases until at 1830 deg. it is very considerable.

This capacity of chrome-magnesite brick to yield under stress without rupturing accounts, at least in part, for its high thermal shock resistance. Brick made from magnesite or chromite alone shows no such marked tendency, being practically elastic in its behavior until well above red heat. That other factors are, however, involved in thermal shock resistance is shown by the fact that most magnesite brick made from sea-water magnesia has a high thermal shock resistance (30 reversals) and yet is elastic at least up to 1650 deg.

Earlier articles on the all-basic furnace have dealt at length with the bursting of chrome-magnesite brick in contact with iron oxide. It is still considered that this is one of the main causes of failure of chrome-magnesite brick when used in open-hearth furnace roofs. The process of solid solution of iron oxide in the working face has been very clearly demonstrated by Hugill and Green in the serial photomicrograph reproduced in Fig. 13. In service, the gradation from the working face to the unchanged brick is relatively slow, and hence the photograph shown was taken from a laboratory prepared sample.

The features are, however, characteristic of those observed under service conditions, namely, absorption of iron oxide by the chrome grains in the working face and the tendency for the silicate matrix to react with the incoming iron oxide; the reaction product passing into the brick away from the working face. Recent X-ray examination of samples removed from a basic roof after 10 weeks' service, showed the existence of a zone about 2 in. from the face that was rich in forsterite ($2MgO.SiO_2$) and monticellite ($CaO.MgO.SiO_2$).

Analyses of the various zones suggested that part, at least, of the lime has been picked up from the furnace atmosphere. The roof in question was suspended by a system of levers and dead-loading, so that the skewbacks were capable of movement during heating and cooling at weekends. The fact that they showed no movement due to the absorption of iron oxide by the working face confirms the opinion that the latter is in a plastic condition when the furnace is at top temperature and that growth simply results in "slabbing off." This is greatly accentuated by week-end cooling, since opening of the joints detaches large areas that would otherwise have remained in place for a long time and protected the undamaged brick behind.



RIGHT

FIG. 13 — Serial photomicrograph showing action of millscale on chrome-magnesite brick (Infra-red radiation; enlarged 20 diameters).

LEFT

FIG. 14 — Linear bursting expansion of chrome-magnesite brick heated in contact with mill scale. Upper curve: test made using distance cathetometer. Lower curve: test made using push rod system.

The remarkable rate at which this expansion, due to solid solution of magnetite in the chrome grains, occurs, is shown in Fig. 14. The top curve was obtained by measuring the expansion of a 3 x 2 x 2 in. test piece when heated up in contact with millscale. It will be seen that long before the maximum temperature of the furnace was obtained, considerable growth had occurred. This is in line with experience in reheating furnace hearths where bursting is found to take place at temperatures well below those existing in open hearth furnaces.

The literature contains a large number of determinations of the thermal conductivity of chrome-magnesite bricks. It has been claimed that they fall so rapidly with increasing temperature that under open-hearth furnace conditions they afford a greater thermal resistance than the normal silica bricks. The simulation of steel plant conditions in the laboratory is extremely difficult, but test data suggests that if, in fact, such a difference exists, it is negligible and cannot be counted as an advantage in the use of chrome-magnesite brick. However, the longer life of chrome-magnesite brick in open-hearth furnaces probably does result in some fuel economy due to the reduction in the number of shut-downs required.

A number of other composite refractories containing chrome have been developed, notably chrome-silica, chrome-alumina, chrome-dolomite and chrome-olivine brick. The properties of chrome-silica and of chrome-dolomite brick have already been discussed (see THE IRON AGE, July 15 and 23, 1942, and Aug. 5 and 19, 1943).

Lynam and Rees have prepared a number of bricks from chrome-bauxite mixtures, but have come to the conclusion that such bricks are unlikely to give as good service under the severe conditions met with in the basic open-hearth furnace as the ordinary chrome-magnesite brick.

The chrome-olivine brick associated with Goldschmidt's patents may well prove more useful, since the presence of a considerable amount of forsterite undoubtedly results in a reduced bursting tendency. This is thought to be due to preferential attack of the iron oxide on the forsterite rather than on the chrome. According to Hugill and Green, the products of such reaction are enstatite and magnesio-ferrite.

One possible disadvantage, however, is that if large quantities of these minerals are formed together with a good deal of glass, they may result in a brick having very different elasticities for the working face and the cooler section behind. This kind of zoning appears to be one of the main causes of failure of basic brick in open-hearth furnaces, probably because it results in high stress concentration at the interface. The slag resistance of such brick is also likely to be somewhat lower than that of the normal chrome-magnesite brick.

Applications

The uses of chrome and chrome-magnesite brick have already been fully discussed in dealing with furnaces. (THE IRON AGE, May 22 and 29, 1941, March 5 and 15, May 28, June 4 and July 6 and 23, 1942). Reference has also been made to the use of chrome as a "parging material" for open-hearth furnaces and the use of chrome plastics in reheating furnace and soaking pit hearths. In many steel plants the bricks left over from back and front wall repairs are sufficient to supply the chrome-magnesite paste used for patching jambs and port ends.

The presence of the iron oxide does not appear to be in any way deleterious and such cements develop quite good plasticity when pan milled with water. Numerous special cements made by mixing chrome or chrome-magnesite with water-glass, cement fondu, etc., are available and give good service in the positions for which they are recommended. One factor that must always be borne in mind, however, is the possibility of chrome pick-up in steel. Remarkable instances have been observed in which serious contamination has occurred, even by pouring steel through a taphole lined with chrome cement or by chrome-magnesite brick falling from the side walls of arc furnaces into highly reducing slags. For this reason, also, the use of chrome refractories in in-

(CONTINUED ON PAGE 166)

Thermal Reduction of Magne

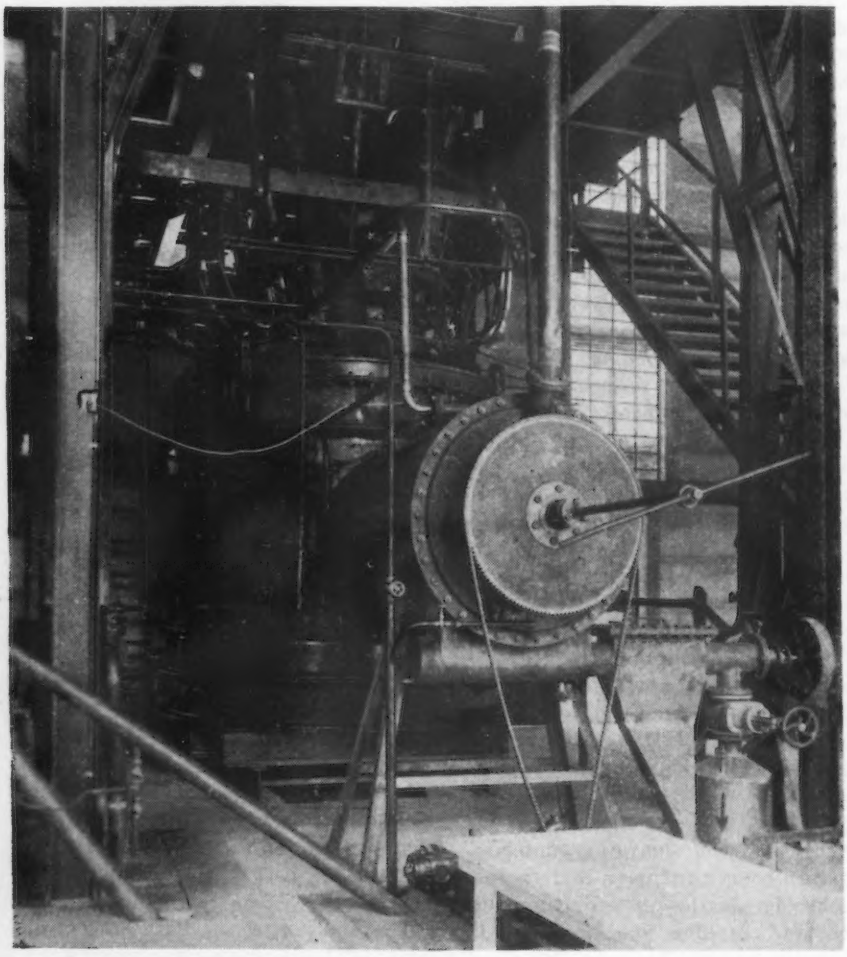
THE element magnesium was at the time of its discovery in 1833, produced by the thermal reduction of anhydrous magnesium chloride with potassium and sodium. As both of these reducing agents are highly electropositive elements, the reduction temperature is comparatively low, and therefore the magnesium can be recovered in liquid form. In general, this is the case only if reducing agents belonging to the group of alkali metals are used. If other reducing agents are used, the reduction temperature increases and the magnesium is liberated in the vapor state.

For the commercial production of magnesium, the alkali metals are too expensive. Therefore, it can be said that magnesium belongs to the group of metals which are recovered at the temperature of their reduction in the vapor, or gaseous state. The most commonly known other members of this group are zinc, mercury and arsenic. It is, therefore, not to be wondered at that early attempts were made to reduce magnesium compounds, with the most common reducing agent in metallurgy—carbon.

** This material is a condensation from "Magnesium," a book under preparation by the author, to be published by Industrial Research Service, Dover, N. H. Copyright to the illustrations is retained by the author.*

o o o

FIG. 1—600 kva reduction furnace at Radenthein, 1933. The gas tight, steel hull surrounds a lining of solid carbon blocks and an isolating layer of granulated charcoal.



The practice of zinc smelting, in England, dates back to about 1730, and consists of mixing oxydic zinc ores with carbon, and heating this mixture to a temperature around 2190 deg. F. At this temperature a mixture of zinc vapors and carbon monoxide is evolved from the reduction chamber (retort) and cooled in a condensation chamber, where the zinc metal condenses in liquid state, and the carbon monoxide evolves.

It was assumed by earlier metallurgists that a similar method could be used for the metal magnesium: simply to mix magnesium oxide with carbon and subject the mixture to a treatment like that used in smelting zinc ores. A German patent exists from 1884,[1] the claim reading, "A method of extracting metallic magnesium, which method consists therein that the mineral or product containing magnesium is already mixed with iron oxide and carbon, or with carbon alone, and this mixture is brought in closed vessels to a white heat, whereby the over-distilling magnesium vapors are caught up in receivers of well known shape."

In 1889, another German patent[2] was issued with the following claim: "The reduction of aluminum and magnesium from the oxides by heating a mixture of the oxides with carbon, formed to rods in the manner of the carbon rods of electric arc lamps switched into an electric circuit, while at the same time the influence of the carbon monoxide on the reduced metal is prevented by a stream of an indifferent gas, or by vacuum."

As will be seen later, the first mentioned German patent was based on an entirely erroneous assumption, and the second patent, which disclosed the fact that the carbon monoxide formed during reduction attacks the metal during condensation, was surely not successful in recovering any substantial yield of the metal. At the same time, general efforts were made to recover from oxydic compounds the metals of the alkaline earth group and aluminum, by smelting with carbon. All these efforts were unsuccess-

sium Compounds

By DR. F. J. HANSGIRG
Black Mountain College, N. C.

. . . The most discussed and controversial of the various magnesium reduction methods has been the carbothermal process. *Here, in a two part article of which this is the first part, the author, inventor of the process, gives a first hand, highly detailed account of its experimental development in Austria and its commercial application in Korea and at the Kaiser Permanente plant. In addition he discusses briefly other reduction methods and the future commercial position of magnesium.

ful, as the other metals of the alkaline earth, as well as aluminum, form stable carbides.

Later investigators have repeatedly studied the question of whether magnesium compounds, especially magnesium oxide, can be reduced by carbon, or whether magnesium forms a carbide analogous to that of calcium. The final conclusions were, (1) that magnesium oxide can be reduced by carbon at a temperature around 3630 deg. F. with high velocity; (2) that thermal production of a magnesium carbide analogous to calcium carbide is not possible, as magnesium carbide easily decomposes; and (3) that metallic magnesium cannot be condensed in the presence of carbon monoxide, because at the condensation temperature of around 2100 deg. F. and at the much higher temperatures before the condensation point is reached, the carbon monoxide oxidizes the magnesium vapors, re-creating the starting materials, a mixture of magnesium oxide and carbon. This back reaction of magnesium vapors with carbon monoxide can be prevented to only a small extent by dilution with inert gases, or by vacuum. Therefore, any hope of producing metallic magnesium successfully, by smelting magnesium compounds with carbon, was abandoned.

If the equation:

$$MgO + C \rightleftarrows Mg + CO$$

is carefully investigated, it symbolizes a perfectly reversible reaction, and every reversible reaction, by the laws of thermodynamics, represents at a certain temperature a state of equilibrium. Therefore, it is to be expected that at a very high temperature, say at 3600 deg. F., and above, the equilibrium is shifted to the side of magnesium vapors and carbon monoxide. And at a temperature of, say, 3300 deg. F. and below, the equilibrium is shifted to a great extent to the side of magnesium oxide and carbon. Therefore, by cooling a mixture of magnesium metal vapors with carbon monoxide to a temperature of 3300 deg. F. and below, the speed of reaction in the direction to the left side of the equation becomes very high in comparison with the speed of reaction to the right side. This is the reason why by slow cooling, metallic magnesium cannot be condensed in the presence of carbon monoxide gas.

But a certain trick exists with reversible reactions, consisting of the so-called freezing of an equilibrium. If, for example, metallic magnesium is brought in contact, even in fine distribution, with carbon monoxide gas,

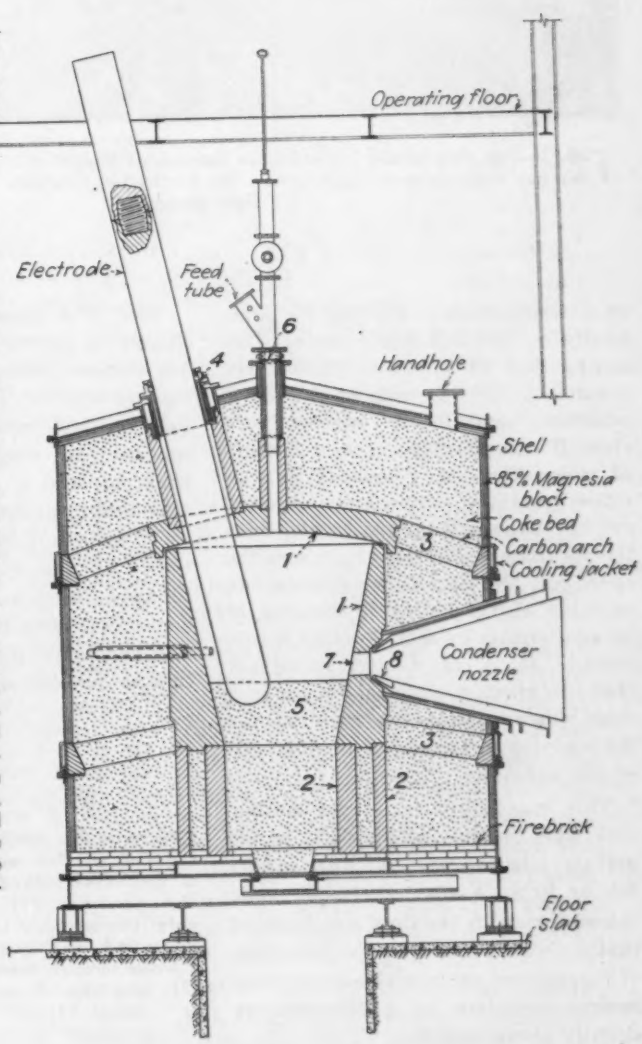


FIG. 2 — Square section of 8000 kva reduction furnace at Permanente. Carbon blocks (1) form furnace crucible supported by carbon cylinders (2) and carbon arch stones (3) which keep crucible stones in centered position. Water cooled and insulated glands tighten electrodes on the roof. The lower part (4) of crucible is filled with carbon grains or coke grains in which electrodes are immersed on hot granulated coke bed (5); briquetted raw material, which gasifies immediately, falls through feed tube (6). Magnesium vapors and carbon monoxide are discharged at (7); chilling gas is introduced at (8). Layout is practically identical with that of Konan furnace. Radenthein furnace had a charging device from below to press charge into the electrode triangle.

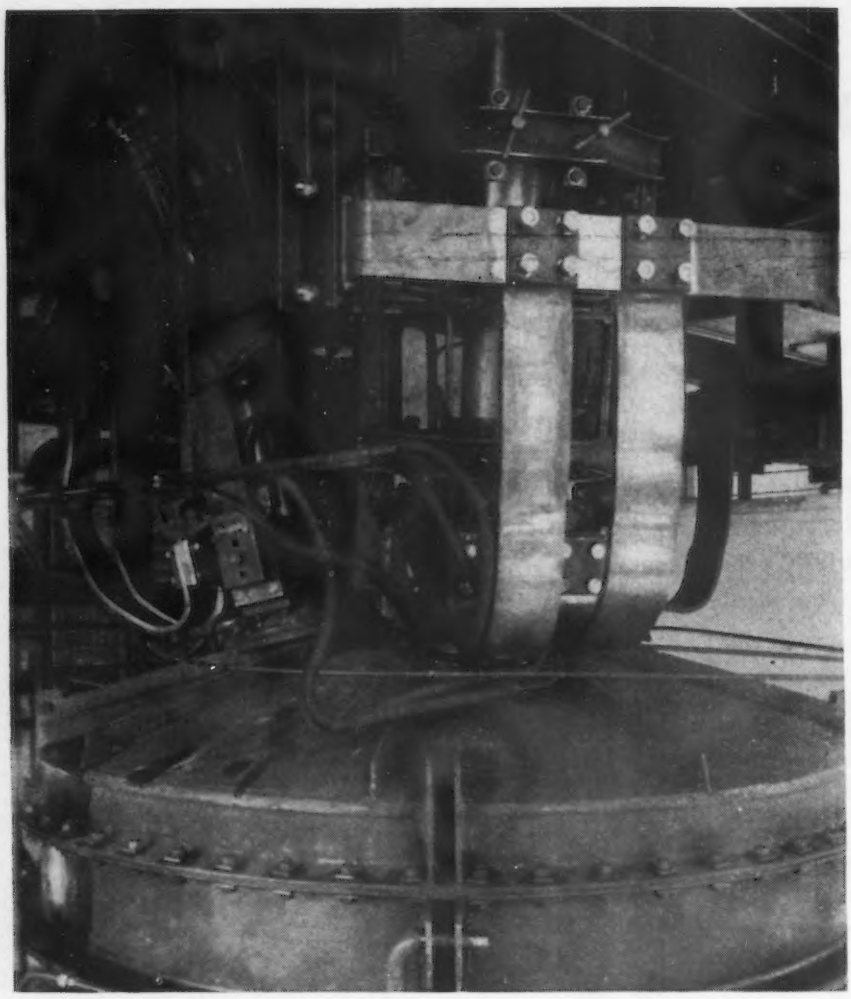


FIG. 3—Top view of 600 kva reduction furnace at Radenthein, shown in Fig. 1. Note the gas tight construction and how the electrodes penetrate the roof through gas tight glands.

at a temperature of 400 deg. F., practically no reaction takes place. This means that at this temperature the reaction to the left side of the above equation has already become very slow. If it is possible to cool a mixture of magnesium vapor and carbon monoxide from the temperature of 3600 deg. F., where they are stable, to a temperature of 400 deg. F., where the speed of reaction is very slow, an example of the so-called freezing of an equilibrium by shock-cooling is presented. It is, of course, important that this shock-cooling take place in a time shorter than that required for the reaction to proceed to the left side of the equation.

This was the premise the author took when he started his work in his private laboratory in Vienna, in the fall of 1928. A short thermodynamic calculation with the data available at that time indicated that the reduction of magnesium oxide with carbon must become complete at a temperature slightly above 3600 deg. F.

The first experiments were conducted in cooling the magnesium vapor-carbon monoxide mixture on a cooling surface. A Tammen furnace heated small batches of a briquetted mixture of magnesium oxide and charcoal, and a stream of hydrogen was used to protect the carbon tube of the Tammen furnace against oxidation. At the end of the Tammen furnace tube, a water cooled condenser was attached. After the reaction had taken place in the condenser tube, a powder was found consisting of finely distributed magnesium, together with granular drops of magnesium.

In 1929, Austro-American Magnesite Corp. at Radenthein, Carinthia, took an interest in the development of this magnesium process. A 400 kva arc furnace was erected to try out the reaction on a larger scale. Opposite the discharge hole of the furnace, a water cooled steel tube system was arranged, and it was expected that this large cooling surface would effect a fast enough cooling of the magnesium vapor carbon monoxide mixture to prevent back reaction. A transporting screw and hopper were provided to move the magnesium powder and grains from the condensing system. A slight amount of hydrogen was also introduced into the electric arc furnace to protect the magnesium from any contact with air. After this arc furnace was heated to 3600 deg. F., briquettes formed from a finely ground mixture of magnesium oxide and charcoal in stoichiometric ratio, were charged by a gas tight device into the arc zone of the electric furnace. The hydrogen coming from the condensing system was constantly analyzed for its carbon monoxide content.

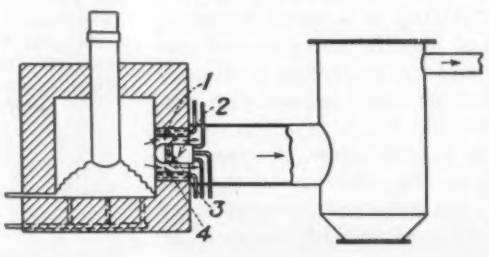
At the beginning, the carbon monoxide content was quite according to expectation, which means that the back reaction was prevented and metallic magnesium must have been formed, but after a few hours the carbon monoxide content in the hydrogen dropped to a negligible amount. After cooling down the system, it was found that only a fine dust was formed which stuck to the cooling system, and that a differentiation in color existed between the layer of powder directly in contact with the cooling surface, and the layer forming the outside surface of the deposit. The layer in contact with the cooling surface was gray, and had the highest magnesium content (up to 35 per cent), while the outside layer was entirely black and contained no magnesium.

The explanation was easy: the cooling took place only at the begin-

o o o

FIG. 5 — Gas chilling device as first used at Radenthein. In discharge hole (1) a water cooled body (2) is inserted; chilling gas is blown through nozzles (3) into the annular space (4).

o o o



ning; the heat conductivity was reduced by the adhering dust so that the cooling of the magnesium vapor-carbon monoxide mixture was slowed down, and full back reaction took place. These results were rather disappointing as this experiment showed that it is impossible to obtain higher yields on metallic magnesium by the action of a cooling surface. [Later, in 1934, W. J. Tredwell and J. Hartnagel published in *Helveticia Chimica Acta*, an article containing a thermodynamic calculation for the reduction of magnesium oxide with carbon. These experiments led to a magnesium dust with 25 per cent metal content.] Therefore, another method of shock-cooling in a faster and more effective way was conceived; to inject in the mixture of magnesium vapors and carbon monoxide, immediately after discharge from the reduction zone, a stream of a cold gas inert to magnesium.

At that time the idea that it was possible to condense the magnesium immediately into a liquid or solid state, was given up. Therefore, a two step process was conceived, consisting of (1) making a fine powder of metallic magnesium as effected by gas shock-cooling, and (2) recovering the metal from such fine powder, either by coalescing the powder to a liquid magnesium bath, or by recovering the magnesium from powder by distillation or sublimation.[3] The method of shock-cooling for a stabilization of equilibrium was disclosed in *Hansgirg, U. S. Patent No. 188493* (Austrian priority 1931).

The pilot furnace at Radenthein was rearranged according to the new conception, and the first run was immediately successful, establishing the soundness of the new assumption. A powder was produced containing up to 60 per cent of metallic magnesium.

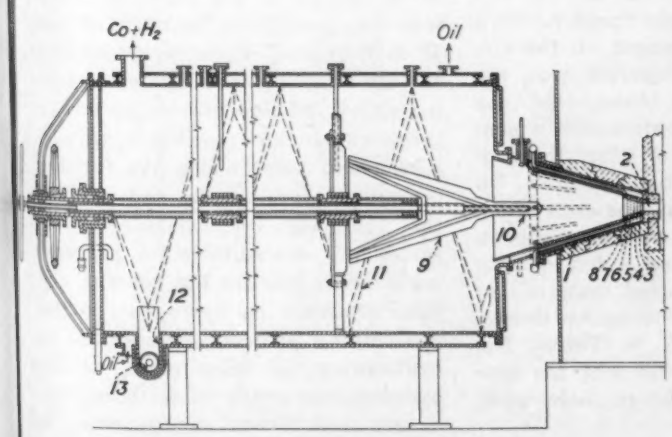
As a starting material, dead burned magnesite was used containing 80 to 90 per cent magnesium oxide. The charge on charcoal was calculated to reduce the accompanying impurities consisting of calcium oxide, silica, alumina and iron oxide to form the respective metals or carbides of the oxides. Special means were provided to remove these metals and carbides from the reduction furnace. The furnace was lined with solid carbon blocks, which were surrounded by an isolating layer of granulated charcoal, and this whole arrangement was surrounded by a gas tight steel hull (Figs. 1 and 2).

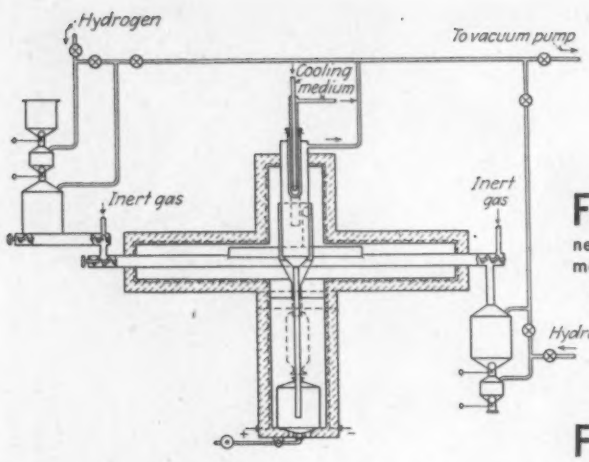
The practical operation showed the interesting fact that the impurities contained in the magnesite did not accumulate inside the furnace. They flew out from the furnace space by the force of the reaction and the electric arc, and were 100 per cent present in the magnesium dust. The dust also contained some graphite from the disintegration of the graphite electrodes. In addition, the dust contained some magnesium oxide and carbon. The microscopic structure of this intimate mixture of magnesium oxide and carbon excludes the possi-

FIG. 4—Operation platform and gas tight charging device for raw material briquettes at Radenthein 600 kva reduction furnace.

o o o

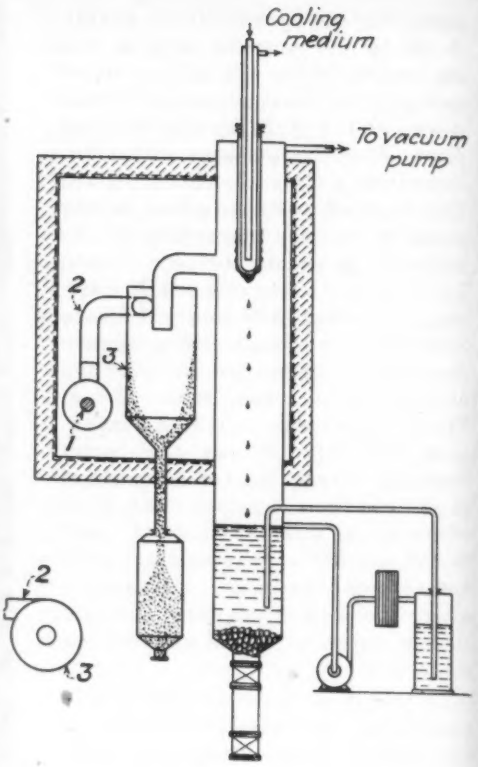
FIG. 6—Chilling device improved over that shown in Fig. 5. Cone (1) is inserted in the discharge opening of the furnace and the chilling gas blown into the stream of the magnesium carbon monoxide mixture (2) through a row of nozzles (3, 4, 5, 6, 7, 8) on the circumference of the inserted cone. Also shown is the scraping device (9) which introduces the liquid cooled scraper (10) into the discharge hole of the furnace at intervals of 10 to 20 min. Scraper is inserted by an automatic time clock controlled device not shown in this picture. A transporting device (11) cleans the expansion chamber wall and moves the dust to discharge opening (12) with dust screw (13).





LEFT

FIG. 7—Schematic section through continuous magnesium distillation equipment for dust, using the screw conveyor system.



RIGHT

FIG. 8—Schematic section through continuous magnesium condensation equipment using the oil dropping method. From the screw conveyor (1), the magnesium vapors flow through (2) to the cyclone (3), where dust is separated and purified magnesium vapors are condensed on cooling surface (4) in liquid form. From here the pure magnesium drops into hydrocarbon oil.

bility that unreacted starting materials were flying out from the furnace and mixing with the magnesium dust. The intimate nature of the mixture indicates the presence of back reacted material. Based on the analyses of the magnesium dust, the chilling efficiency calculated up to 85 per cent.

The next step was to develop a method of recovering the metal in liquid or solid form from the magnesium dust. First a process of coalescing the finely divided magnesium particles in an inert atmosphere was studied. It was found, if this powder was heated near the boiling point of magnesium in a protective atmosphere of a gas inert to magnesium, that by local distillations, granules of magnesium of variable sized droplets, as small as 0.05 in. up to large pieces measuring 3 or 4 in. were formed inside the dust.[4] These granules could be screened off from the surrounding powder and easily melted in a crucible. The magnesium recovery was very incomplete by this method; the operation was inconvenient, as the mass easily caught fire during the screening process; and, finally, the recovered magnesium, being in close contact with the other metallic impurities in the dust, was impure. Therefore, the method was given up, and efforts were made to develop a distillation process to recover the metal from the dust.

The magnesium dust, as recovered by the gas shock cooling, is extremely finely divided and pyrophoric if it comes in contact with air. Therefore, all the dust bins and hoppers, the transporting screws, and wherever the dust was handled had to be of airtight construction and filled with a gas inert to magnesium (Figs. 3 and 4).

All the inert and protecting gases usually used in the chemical industry, like carbon dioxide, carbon monoxide and nitrogen, cannot be used as protective atmospheres for magnesium dust, as finely divided magnesium reacts with them. Only hydrogen, gaseous hydrocarbons and real inert gases like argon, are safe protectors. As hydrogen was used for the shock-cooling, it was also used as a protecting gas in the equipment for transporting and storing the magnesium dust.

In the Hansgirg U. S. Patent No. 188493, a chilling device for the magnesium carbon monoxide mixture was described, in which the admixture of the hydrogen was administered in an annular space (Fig. 5). This was later modified by equipment described in U. S. Patent No. 2109841. The new arrangement consisted of a conical device inserted in the discharge opening of the furnace. By a row of nozzles arranged on the circumference of the inserted cone, the chilling gas was blown into the stream of the magnesium-carbon monoxide gas mixture to effect the sudden chilling of temperature. On longer time operation, the observation was made that the discharge hole in the furnace wall had a tendency to clog with back reacted material, so that an automatic cleaning device, also described in U. S. Patent No. 2109841, was connected with the cone to keep the discharge hole open (Fig. 6).

As the main principle of the carbothermal magnesium reduction was established by the freezing of equilibrium, it was, of course, to be expected that this fast cooling could be effected not only by admixing a gas inert to magnesium. For the same purpose, liquid sprays and even solids in finely distributed form could be applied. For liquids, the selection is comparatively small, as there are not many liquids which are inert to magnesium except molten metals or hydrocarbon oils. The idea of using hydrocarbon oils for the chilling of the magnesium vapor carbon monoxide mixture goes back to 1933, when, independently, Frank Kemmer[5] in this country, and the writer, in Austria, made the same proposition. Kemmer had the earlier priority for his U. S. application. Much later, after the patent of Kemmer was published, Doermer, of the U. S. Bureau of Mines, proposed also the use of hydrocarbon oils as a chilling agent. At Radenthein, the writer investigated this possibility with a pilot plant, using a 600 kva furnace on quite a large scale, and reached the following conclusions: Hydrocarbon oils are suitable for preventing the back reaction but not with the same efficiency as hydrogen; during the chilling process a great loss of hydrocarbon oil takes place, as the hydrocarbons crack to methane, hydrogen and carbon if they come in

contact with the magnesium vapors at a temperature of 3600 deg. F.

The hope that the cracking of the hydrocarbons would result in the production of hydrocarbons of the gasoline type with high octane number was not fulfilled, for this would have contributed to the economy of the process. Finally the separation of the distributed magnesium powder from the oil became a difficult problem. The magnesium forms a fine emulsion with the hydrocarbon oils, which is difficult to filter or to separate by means of a centrifuge. The only way to recover the magnesium dust from the oil is to evaporate the oil and to bake the powder, which makes it necessary to heat the mass to a temperature around 900 to 1000 deg. F.

The lower efficiency in preventing the back reaction, and the great complication in recovering the magnesium dust from the oil, and finally the great losses in oil, have proved this method is not economical. Therefore it was given up at the end of 1933. But the experimentation with hydrocarbon oil led to development of a granulation method for the dust, later used in Korea on a commercial scale. The gas-chilled magnesium dust was mixed with hydrocarbon oils to form a strong paste, later pressed into shaped bodies which were baked by evaporating the hydrocarbon oils. By some cracking of the oil, the magnesium dust particles are fritted together with carbon, which forms a solid skeleton, remaining solid even after the magnesium evaporates from such granules.

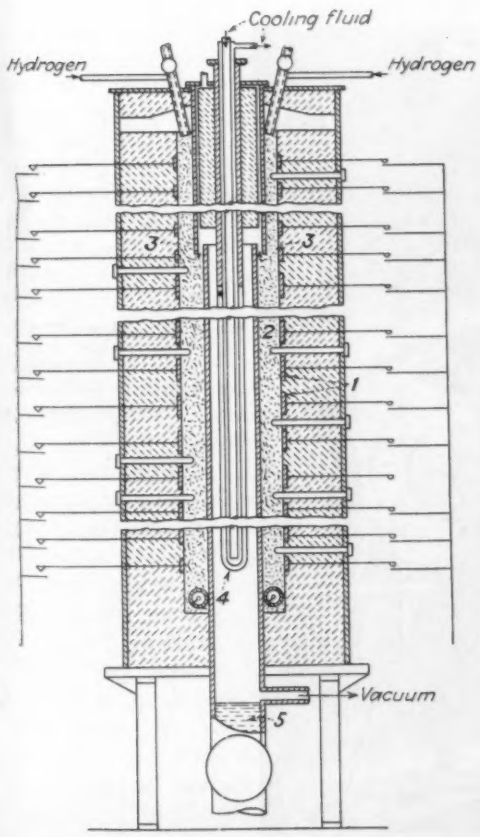
Later, a continuous dryer was developed based on the principle of a revolving table, rotating between a system of electric heaters, to supply the heat for the baking of the shaped paste by radiation. This shaping of the magnesium dust into compact bodies before distillation was a great improvement, as it prevented to a large extent the carrying off of the finely divided impurities by the magnesium vapors from the evaporation chamber to the condensation chamber.

It is the aim of every process engineer to arrive at a continuous process; so, also, it was the aim of the author to develop, as a second step, a continuous distillation process. The first attempt was merely to transport the magnesium dust, as it came from the reduction process, through a heated zone where the magnesium evaporated, and to conduct the magnesium vapors to a condenser.[6]

A screw conveyor made out of heat resistant steel was arranged inside an electrically heated chamber, and the magnesium dust was transported by means of the screw conveyor through the heated zone so that the screw conveyor itself acted as an evaporation chamber (Fig. 7). In the center of the screw conveyor, ducts were arranged to withdraw the magnesium vapors. The magnesium dust was charged by means of a charging hopper on one end, and the waste was withdrawn at the other end of the screw conveyor.

As heat resistant steel equipment loses its mechanical strength at a temperature above 1800 deg. F., the evaporation was done in a vacuum of about 0.79 to 1.18 in. to lower the evaporation temperature. To prevent the magnesium vapors from entering the cooler, end parts of the screw conveyor, a slight stream of hydrogen was introduced on both ends to conduct the magnesium vapors toward the center (Fig. 7).

The continuous condensation of metallic magnesium from a vacuum faces great difficulties. One, strictly physical, is caused by the characteristics of the boiling curve of magnesium. The other difficulties are purely mechanical, consisting of the fact that the magnesium vapors carry dusty impurities with them into the condensation chamber, and if the metal condenses together with them it sticks on the condensing surface and forms, with the dust impurities a pasty mass which does not flow out from the condensing chamber. Every chemist ex-



o o o

LEFT

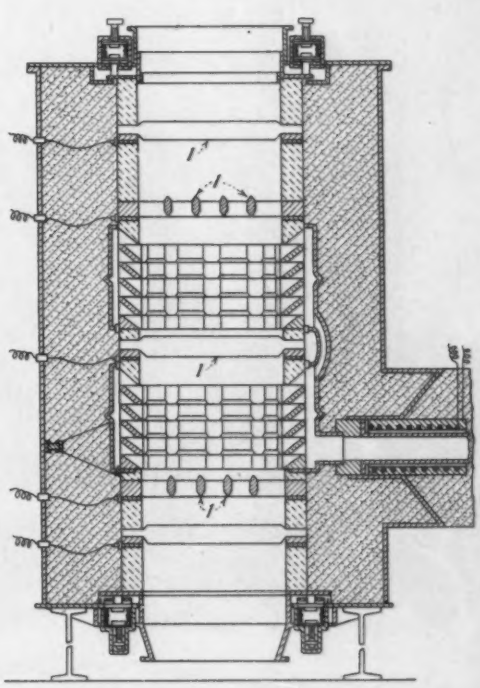
FIG. 9 — Section through vertical shaft furnace for magnesium distillation. The contact plates (1) distribute the current evenly through (2). The magnesium vapors escape through (3) to be condensed on (4) and drop to hydrocarbon oil (5). Such furnaces were installed at Konan, Korea.

o o o

RIGHT

FIG. 10 — Shaft furnace for magnesium distillation current flowing in direction of material flow. Carbon rods (1) distribute current as well as possible through mass of dust grains. Magnesium vapors here are condensed in an outside condensing system. Such a furnace was installed at Swansea plant, South Wales, England.

o o o



perienced in laboratory work knows how the fluid properties of mercury are changed by mechanical impurities. If the mercury forms a dirt skin on its surface, it adheres even on glass. But the specific gravity difference of mercury is six to seven times greater than any dusty impurities connected with it, so that mercury, even if impurities are present, collects in larger droplets and separates from them.

Magnesium's low specific gravity, being of the same order as those of the impurities, prevents its collection in larger drops. It distributes among the impurities, forming a sticky, pasty mass. It is therefore essential to remove from the magnesium vapor all dusty impurities before it enters the condensing chamber. For this purpose, filter systems[7] or dust catchers based on cyclone principles[8] have been inserted into the stream of the magnesium vapors. But all these means have never entirely prevented the contamination of the condensing chamber by flying dust, and after a certain time this dust accumulates to such an extent that the withdrawal of liquid magnesium becomes difficult. To overcome this, a new device was introduced[9]. In this arrangement, the inside of the condensing chamber was heated, while a tubular condensing surface was inserted, on which the magnesium condensed and liquefied. The lower end of the condensation chamber was then filled with a high boiling, hydrocarbon oil. The magnesium condensed on the inner tube dropped into the hydrocarbon oils where it formed clean metallic droplets. The dusty impurities distributed among the hydrocarbon oil which was continuously circulated over a filter system. The magnesium drops were, from time to time, removed from the condensing chamber (Fig. 8). By this arrangement it was possible to separate the magnesium from the flying dust, and also to remove everything completely from the condensing chamber.

But this arrangement does not overcome the difficulty mentioned before, based on the specific characteristic of the vapor pressure curve. Metallic magnesium has quite a high vapor pressure even before it reaches its melting point. The vapor pressure is about 1 mm. at 1150 deg. F. and nearly 0.08 in. at 1200 deg. F. If the magnesium is condensed in liquid form, such condensation must take place at about 1300 deg. F. as the viscosity of the metal near the melting point is very high, so that it becomes difficult to remove the metal from the condensation chamber at a temperature near the melting point. At 1300 deg. F. the vapor pressure has already reached a value of 0.19 in.; therefore a certain part of the metal remains uncondensed in the main condensation zone, and passes out to places in the condenser where the temperature is lower, until, finally, zones in the condenser are reached where temperatures are below 1200 deg. F., where there is still a vapor pressure existent around 0.08 in.

Therefore it is unavoidable that the last bit of magnesium vapor corresponding to a vapor pressure below 0.08 should condense in solid form somewhere on cooler parts of the condensation chamber or in the outlet duct of the condensation chamber, where temperature passes through the above mentioned values between 1200 deg. F., the melting point, and 700 deg. F. where the vapor pressure becomes practically zero. If hydrogen is used as a transporting gas, it is saturated with magnesium vapors according to partial pressure, and at a temperature of 700 deg. F.; if the total pressure is 0.79 in., the hydrogen contains 10 per cent by volume of magnesium vapors according to a partial pressure of 0.08 in. at 700 deg. F. By further cooling, this magnesium always condenses in a solid state. This fact causes great difficulty in the continuous condensation of the metal in the liquid state under vacuum, and especially in the presence of an inert carrier gas. Several devices were applied to move the zone where the solid deposit occurs by melting it down, or to chill the hydrogen saturated with magnesium vapors inside the condensation chamber to precipitate the mag-

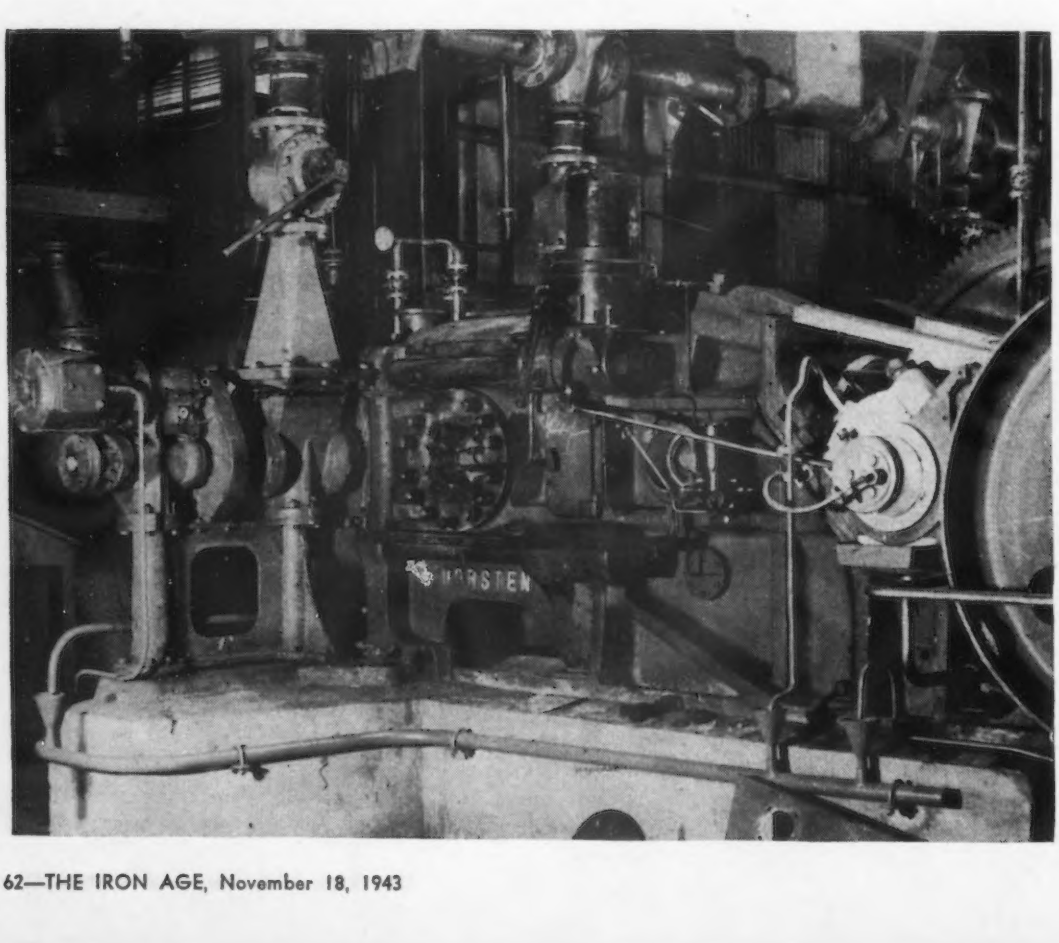


FIG. 11 — Heavy magnesium dust press of the piston type, as installed at Swansea plant.

nesium in the form of a dust. Mechanical scraping devices were also arranged to remove the solid deposits from the condensation chamber. But all these devices did not work very satisfactorily, so that it is the belief of the author that the problem of the continuous condensation of magnesium in liquid state under application of vacuum, has not yet been solved.

Other difficulties exist with the equipment described. The heat transfer between the heating surface, as provided by the tubular outside hull of a screw conveyor, is not very effective for dust, and is still less effective for granulated material.

As was to be expected, these granules have a certain electrical conductivity, so that it was quite obvious that a much better heat transfer could be achieved if the granulated material itself were used as an electric resistor. Such methods were already known in electrothermal zinc smelting.

A large scale investigation was therefore undertaken to construct a shaft furnace where the granular material of baked magnesium dust would be moved continuously by gravity, with electrodes properly distributed inside the shaft to supply electric current to the granular mass, which would be heated up to the distillation temperature (Fig. 9).

These ideas led to further developments.[10] The main difficulty was to distribute the electric current equally throughout the total volume of the granular mass contained in the shaft. In all types of granular condensers the electric conductivity increases with temperature. If, therefore, the electric current passes on some preferred path of lower resistance caused primarily by a more or less close mechanical arrangement of the grains, such a preferred path becomes more heated, resulting in an increase of conductivity, so that more current flows over the preferred path, and so on. The result is that the heat distributes unequally throughout the volume of the shaft, causing great disturbances, as the metal may condense inside the granular mass in spots which are not sufficiently heated. To overcome these difficulties the writer proposed conducting the electric current transverse to the motion of the granular material, so that the path of the electric current would be subdivided in many parallel sections.[11]

In Erdmann's arrangement, the electric current flows in the direction of motion of the granular mass, which leads to the above mentioned difficulties. The use of a continuous shaft furnace with internal heating gives a very efficient heat transfer to the granulated mass, but the other difficulties mentioned before, as involved with the continuous condensation of magnesium in liquid form, were not eliminated by the shaft furnace principle. An additional difficulty was that in a shaft it becomes more difficult to direct the flow of the evolved magnesium vapors entirely to the condensation chamber, and to prevent the magnesium vapors from passing into and condensing in the charging and discharging zones, and it is therefore necessary to introduce quite an amount of hydrogen on the upper and lower end of the shaft. But the increased hydrogen makes the condensation in liquid form more complicated, as described before, on account of saturation of the hydrogen with magnesium vapors (Fig. 10).

The use of hydrocarbons to form granulated magnesium dust, and the necessary equipment for the baking was still an expensive and inconvenient step. Experiments were then made to see if the magnesium powder could not be pressed into tablets like other metal powders, without using a binder. Attempts to tablet the dust without a binder were immediately successful and it remained necessary only to make a selection among the tableting machines on the market.

At the beginning in Radenthein, a multi-die tableting machine, as used in pharmaceutical practice, was applied for making tablets similar to aspirin pills. But the magnesium oxide and the other impurities contained in the dust had a very abrasive action on the die, so that the steel was worn out in a short time. Experiments with the piston type of briquette presses, used to make soft coal briquettes, were more successful. In Radenthein, as later in Japan and England, large piston dust presses were installed which, without a binder, formed the magnesium dust into tablets hard enough to be used later in a distillation process. (Fig. 11).

References

[1] E. V. Puttner, German Patent No. 31,319.
[2] Dr. O. Knoefler, German Patent No. 49,329.
[3] Hansgirg, U. S. Patent Nos. 1,943,601 and 2,025,740 (Austria, 1930).
[4] Hansgirg, U. S. Patent No. 2,025,740.
[5] Kemmer, U. S. Patent No. 2,051,863.
[6] Hansgirg, U. S. Patent Nos. 2,003,487 and 2,002,282.
[7] Hansgirg, U. S. Patent No. 2,003,487 (Austria, 1933).
[8] Hansgirg, U. S. Patent No. 2,022,282 (Austria, 1933).
[9] Hansgirg, U. S. Patent No. 2,239,483 (Austria, 1933).
[10] Hansgirg, U. S. Patent Nos. 2,118,973 and 2,122,139; Erdmann, U. S. Patent No. 2,161,916.
[11] Hansgirg, U. S. Patent Nos. 2,118,973 and 2,112,139.

Editor's Note: Next week, concluding this article, the author describes development of the commercial carbothermal process plants at Konan, Korea, and at Permanente, Cal., summarizes other reduction processes, and discusses the future market for magnesium.

o o o

Precision Balancing

UNBALANCE of armatures can be located in ⅛ to 1/10 the time required for mechanical balancing with a dynetric balancing unit in use at Westinghouse Electric & Mfg. Co., East Pittsburgh. It is possible to precision balance armatures for 50 to 200-hp. motors to 1/10,000 in. of linear movement. Last month more than 1000 armatures were balanced on this machine.

The operator proceeds as follows when he balances an armature: (1) Places the shaft of the armature in floating bearings. (2) Connects the armature shaft to that of a motor-driven sine wave generator. (3) Adds a known weight of molding clay to one end of the armature at the 0 reference point of the sine wave generator index wheel. (4) Rotates armature at 600 revolutions per min. (5) Manually adjusts sine wave generator until the rotor is in phase with the stator, at which point the armature is in balance with the machine. (6) Weight of metal necessary to bring one end of the armature in balance is read on the scale of the large instrument in center of panel. The horizontal movement of the armature, due to vibration, is transmitted by the floating bearings through a mechanical connection to an electrical coil whence it is electrically transmitted to electronic tubes which amplify the unbalance so it can be recorded by the instrument. (7) Sine wave stator index wheel indicates place on armature with respect to 0 reference point of the sine wave generator index wheel where the weight that was read on the instrument must be added to bring that end of the armature in balance. The operator then repeats these steps for balancing the opposite end of the armature.

Current Zinc Electroplating P

By ADOLPH BREGMAN
Consulting Engineer, New York

o o o

IN many instances electrodeposited zinc, after removing the work from the bright plating bath, acquires a brown surface film. This may be removed by dipping for 5 to 30 sec. in 0.5 per cent nitric acid or acidified hydrogen peroxide (0.25 per cent sulfuric acid, 4 per cent hydrogen peroxide). The latter method is covered by two U. S. Patents [E. I. du Pont de Nemours & Co., No. 2,154,-451 (Hull) and 2,154,469 (Oplinger)].

Unichrome alkaline zinc is a recent development of the research laboratories of United Chromium, Inc., for the electrodeposition of zinc from a mildly alkaline, non-cyanide, zinc solution. Smooth, adherent deposits are obtained at a high plating speed and the throwing power is excellent.

The bath can be used with all types of plating equipment, including still tanks, automatic and semi-automatic conveyors and barrels. Since the bath is but mildly alkaline and contains no cyanide it is not destructive to equipment and permits the use of bakelite barrels. It is safe to operate as it is non-corrosive to flesh and clothing; it is non-toxic and does not evolve poisonous fumes. Hence, under normal operating conditions, no special ventilation is required and there is no creeping and drying of salts up over the tank sides, work rods and anodes.

The usual cleaning sequences are used before plating. The plating bath is made up from prepared salts.

Constant agitation during operation is desirable. A combination of air and mechanical agitation is excellent.

Either continuous or occasional batch filtration is recommended to remove dirt and impurities which may otherwise give rise to rough deposits.

The optimum operating temperature range is 100 to 120 deg. F. The higher temperatures permit correspondingly higher current densities, though lower temperatures tend to favor brightness of deposit.

Cathode current densities up to 50 amp. per sq. ft. or more may be used, depending upon the operating temperature, the degree of agitation, and the size and shape of the object to be plated.

Under normal operating conditions the anode and cathode efficiencies are practically 100 per cent. For optimum results the anode area should be about the same as the cathode area. When the solution is not in use the anodes should be removed to prevent excess buildup of zinc in the solution.

The normal operating pH range is 10.5 to 11.5 with an optimum of 11.2. A glass electrode pH electrometer or pH papers may be used for control purposes.

Hubbell-Weisberg Process

The Hubbell-Weisberg method of zinc plating, which is now in pilot plant operation, is unique among commercial processes, as it employs an ammoniacal zinc solution without cyanides. Its particular scope is the utilization of cheap sources of zinc, such as galvanizers' skimmings, condensed brass foundry fume, organic reduction residues, or ore from which the zinc is extracted, by leaching with a solution of ammonia and ammonium chloride. The process is suitable for large scale production of electrogalvanized wire or strip, using a minimum of 1½ to 2 tons of zinc per 24 hr. Insoluble anodes are used, and the plating solution, when depleted of zinc, is returned to the leaching plant. The process is economical, as it is operated at high current densities and the conductivity of the plating solution is high. Careful design of equipment prevents loss of ammonia and its consumption is not an important item in operating costs.

Following are chemical methods of analysis for important bath constituents, which entail a minimum of calculation.[8] (Other procedures are also in use, as detailed in "Simple Methods of Analyzing Plating Solutions," published by the Hanson-Van Winkle-Munning Co., Matawan, N. J., and the "Plating and Finishing Guidebook" published by Metal Finishing, New York.)

Reagents: Solution—contains exactly 33.0 gm. per liter potassium ferrocyanide, $K_4Fe(CN)_6.3H_2O$ and 6 gm. per liter sodium sulfite, Na_2SO_3

Indicator—saturated solution of uranium acetate.

(1) Under a hood, to exactly 5 c.c. cyanide zinc solution in a 250 c.c. beaker, 5 c.c. 1:1 nitric acid and 5 c.c. 1:1 sulfuric acid are added. Boil until dense white fumes appear, then add 1 gram ammonium sulfate, $(NH_4)_2SO_4$ and fume about 5 min. more.

(2) Let cool and cautiously add 50 to 75 c.c. distilled water. This should dissolve the precipitate completely.

(3) Add ammonium hydroxide until alkaline to litmus, and then add an excess of 5 c.c. concentrated ammonium hydroxide, NH_4OH. Stir, filter and wash the precipitate with a hot solution of 10 c.c. concentrated ammonium hydroxide per liter distilled water.

(4) Add hydrochloric acid to the filtrate until it is neutral to litmus, and then add an excess of 5 c.c. concentrated hydrochloric acid.

(5) Add 15 grams ammonium chloride, NH_4Cl and 25 c.c. distilled water saturated with hydrogen sulfide.

(6) Heat to 80 to 85 deg. C. and adjust volume to 300 c.c.

(7) Titrate with reagent potassium ferrocyanide solution, using uranium acetate solution on a spot plate as an outside indicator, until the first light red-brown tinge appears.

Number of c.c. reagent potassium ferrocyanide solution used divided by 5 equals oz. per gal. of zinc.

Total Sodium Cyanide

Reagents: 20 per cent sodium hydroxide (NaOH) solution, 10 per cent potassium iodide (KI) solution

Indicator — Standard silver nitrate solution, O.1N made by dissolving 17 gm. of CP silver nitrate in distilled water and diluting to exactly one liter.

(1) Dilute exactly 5 c.c. plating solution sample with 100 c.c. of distilled water in a 250 c.c. Erlenmeyer flask.

Practice

In concluding this two-part article, the author discusses bright dipping and the Hubbell-Weisberg process. The Cronak Process and other methods of after-treatment of the zinc coating are also considered as well as procedure for the analysis of bath constituents.

(2) Add 5 c.c. of 20 per cent sodium hydroxide (NaOH).

(3) Add 5 c.c. of 10 per cent potassium iodide (KI) solution.

(4) Titrate with standard silver nitrate solution until a faint yellow turbidity is noted.

Number of c.c. of standard silver nitrate solution used times 0.261 equals oz. per gal. total sodium cyanide.

Sodium Hydroxide (Caustic Soda)

Reagents: Solution — Sulfuric acid 0.940 normality

Indicator — La Motte sulfo-orange solution.

(1) To exactly 5 c.c. plating solution, add 1 gm. sodium cyanide, NaCN. Then add 10 c.c. water, and 10 drops indicator solution.

(2) Titrate with reagent sulfuric acid solution until color changes from orange to yellow.

Number of c.c. reagent sulfuric acid used equals oz. per gal. sodium hydroxide (caustic soda).

Mercury in Solution

Reagents: Solution 8.3 gm. potassium iodide, KI; Potassium nitrate, KNO_2, C.P.

Indicator—Starch, 1 per cent solution, freshly prepared.

(1) Under a hood, acidify exactly 50 c.c. plating solution in a 250 c.c. beaker with nitric acid. Boil until all cyanides are removed. Cool.

(2) Neutralize with ammonium hydroxide, then add 2 c.c. concentrated nitric acid.

(3) Cool to 20 deg. C. Add a small crystal of potassium nitrate.

(4) Titrate with reagent potassium iodide solution, using 1 per cent starch solution on a spot plate as an outside indicator.

Number of c.c. reagent potassium iodide solution used multiplied by 0.0134 equals oz. per gal. mercury.

Treatment of Zinc Deposits

Zinc coatings, on exposure to the atmosphere, normally develop a compact, adherent film of zinc oxide and other compounds that protects the underlying metallic zinc. However, a different type of corrosion occurs when zinc is in contact with stagnant water, which develops an unsightly, bulky and loosely adherent corrosion product. This has been observed on galvanized sheets stored in damp places, and on zinc alloy die cast parts, automobile carburetors and automobile door lock assemblies, due to entrapment of separated or condensed water.

This type of corrosion may be eliminated by a dip treatment known as the Cronak process[9] developed and patented by the New Jersey Zinc Co., and licensed for use by them without royalty. The operating cycle (See Fig. 5) consists of the following steps:

(1) If the work contains oil, it is cleaned by immersion in a solvent cleaner.

(2) Cathodic cleaning in a hot trisodium phosphate solution.

(3 and 4) Double rinsing in cold water.

(5) Coating by immersion for 5 to 30 sec. in Cronak solution. This consists of a solution containing 26.6 oz. sodium dichromate and 23 to 34 c.c. sulfuric acid per gal.

(6) Double rinsing in cold water.

(7) Drying by blowing off water with air. Unloading and inspecting. Small parts may be dried by whirling in baskets.

The Cronak film obtained by this treatment is an insoluble coating that contains some slightly soluble material. Both the insoluble and the soluble portions are protective, the latter inhibiting the corrosion of any exposed iron or steel surfaces, and of the zinc coating. The nature of the zinc coating or the composition of zinc alloy treated, and the time of immersion determine the color of the film, which varies from light iridescent greenish-yellow to deep yellow-brown. The Cronak film provides its best protection against water that is nearly neutral or slightly alkaline, and it is not effective in acid solutions or in strongly alkaline solutions.

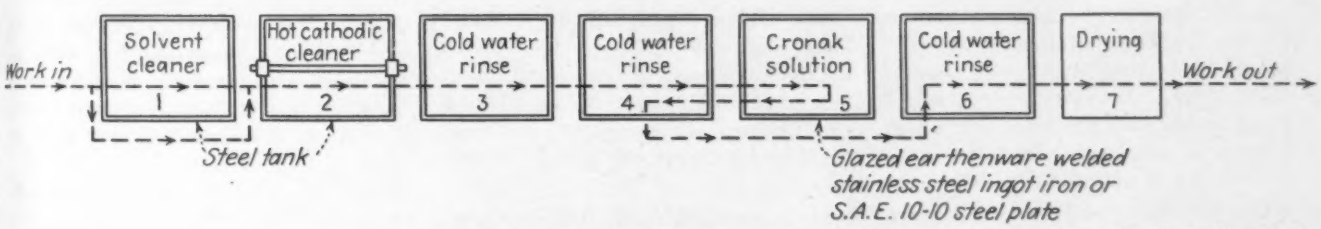


Fig. 5—Flow sheet for the production of Cronak films. *(Courtesy, New Jersey Zinc Co.)*

"Anozinc" is the trade name of the baths developed by United Chromium Inc. in which a finish is obtained by treating the zinc anodically to increase rust resistance of zinc coated steel parts and to retard the formation of white zinc corrosion products. The use of Anozinc for treatment of zinc coated steel parts has received approval on a number of ordnance applications, such as fuse primer bodies, and has qualified for Naval Aircraft Specification ANT-32-Rev-2. Parts finished in Anozinc baths and subjected to standard salt spray tests (AN-QQ-S-9) have stood up in excess of 200 hr. This treatment is also recommended for zinc plating on other metals besides steel.

Depending upon the bath composition employed, a black or yellow finish is obtained, which will withstand considerable abuse in handling. The treatment, which is applied pre-

[9] *"Cronak Process," Technical Service Bulletin, March 20, 1942 (revised), issued by the New Jersey Zinc Co. The process is covered by U. S. Pat. No. 2,035,380.*

ferably over a zinc deposit of approximately 0.0002 in. in thickness, produces no appreciable dimensional change. No special aging or force drying subsequent to treatment is required, the parts being ready for handling immediately after rinsing.

A conventional cleaning cycle is recommended at room temperature in an unlined steel tank. Steel cathodes are used, and the work is made the anode at 6 volts or less. At a current density of 20 amp. per sq. ft. about 3 min. are required to produce the finish. About 2 lb. of Anozinc salts per gallon of solution are used in making up the bath.

The Iridite process has also been designed to protect zinc and cadmium surfaces from rapid corrosion. It involves two essential operations—immersion for a brief time in the solution, and a hot water rinse immediately thereafter. As soon as the material is dry it can be handled and shipped. The equipment needed consists of one tank for the solution and one for the rinse, but the container for the Iridite solution must be acid-proof. Lead lined steel or acid-proof brick lining is satisfactory where large tanks are needed. For small articles a stoneware crock or large battery jar is suitable.

On freshly plated material which has not been handled or smudged with grease, no pre-cleaning is required. Articles may be transferred directly from the last rinse tank in the plating line to the Iridite solution. In general, the requirements for cleanliness are similar to those which precede the introduction of the work into the plating bath. Grease should be removed by an alkali wash or other suitable cleaner, and the adherent alkali well rinsed off prior to dipping in the Iridite solution.

The operation is most effective at temperatures between 75 and 100 deg. F. On items which are racked individually and on which a dark olive drab color is preferrd, an operating temperature between 75 and 85 deg. F. is recommended. For very small parts, which are conveniently plated and finished in large numbers in wire baskets, an operating temperature of 95 and 100 deg. F. is suggested.

On electroplated material the time required for the production of a satisfactory coating is between 10 and 20 sec. The nature of the surface has some effect on this, since a dull plate requires less time to coat than a bright plate.

Mild agitation of the work while in the solution aids uniform coverage, although it is not essential. In some cases where entrapped air bubbles cause difficulty, this may be relieved by the addition of a very small quantity of a suitable wetting agent such as "Tergitol" Penetrant 08, manufactured by the Carbide & Carbon Chemicals Corp.

It is essential that the work be rinsed immediately after removal from the Iridite solution. The work may be rinsed first in a running cold water tank or spray and then carried directly into a hot water rinse.

The method of drying the work is likewise a matter of choice. The work may be air dried, or blown dry with compressed air, or put through a drying oven, depending upon production requirements and the type of finished material.

Bright dipping of electrogalvanized deposits has been discussed previously in connection with cyanide bright zinc baths. Among the other methods of treatment for zinc plate are passivating dips before painting or lacquering and Bonderizing to improve paint adhesion. The first method is prescribed in some U. S. Government specifications.

Probable Trends

Zinc plating will probably be more fully utilized when the value of heavy coatings (0.5 to 3 oz. per sq. ft.) is generally realized, and adequate specifications and inspection are provided. It is anticipated that a greater proportion of sheet and wire will be electrogalvanized instead of hot galvanized. However, hot galvanizing will doubtless continue in use for the inside of pipes and pails, due to the limited throwing power of acid zinc baths. At present, cyanide zinc baths are used to some extent for continuous steel strip plating, and with additional improvements and economies, this application should increase in volume.

Grateful acknowledgment is made to the following individuals for assistance in gathering the material for this article: E. A. Anderson, New Jersey Zinc Co.; Myron B. Diggin, Hanson-Van Winkle-Munning Co., Maurice W. Schwarz, chemist; Dr. Louis Weisberg, consulting chemist; Dr. C. J. Wernlund, E. I. du Pont de Nemours & Co.

Iridite, an Anti-Corrosive Treatment for Zinc Plate

TESTS were completed recently at Wright Field by the Army Air Corps, with a view to determining whether or not Iridite, a process developed by Rheem Research Products, Inc., Baltimore, would answer Army Specification AN-P-32, which calls for the finishing of zinc plate with an approved anti-corrosive treatment that prevents corrosion in a salt spray test (20 per cent salt at 95 deg. F.) for 100 hr.

In the first of three tests, a steel panel, zinc plated and Iridited was subjected to salt spray exposure for 100 hr. and then compared with an unexposed panel. No difference between the two panels was noticed. In the second test, a panel coated with Iridite and finished with one coat of camouflage paint, was exposed last May 24 to salt spray. An inspection made last Aug. 9 showed corrosion only on the top edge of the panel in an area covering one half of a square inch.

The third test, which also was commenced last May 24, consisted of coating a panel with Iridite and subjecting it to 100 per cent humidity at 120 deg. F. An inspection last Aug. 9 showed a minute amount of corrosion along the four flat edges of the panel and in the string spot hole. That test as well as the second, is still going on.

As a result of all of these tests, the Army Air Corps has amended its zinc plating specification as follows:

"1—Specification AN-P-32 requires zinc plate to be finished with some approved anti-corrosive treatment which will prevent corrosion in salt spray test (20 per cent salt at 95 deg. F.) for 100 hr. 5 per cent chromic acid dip must be discontinued."

The protective skin provided by Iridite is so thin that it does not alter the dimensions of the parts to which it is applied. Since the coating is literally soaked into the metal, it is not impaired by bending, forming or twisting. Under ordinary conditions, 100 gal. of Iridite solution is said to coat 20,000 sq. ft. of work. Plated parts are treated by dipping them in a proper solution of Iridite for from 10 to 60 sec. A hot water rinse is recommended to facilitate drying.

Ordnance Department Sets Method for

Needled Steel Specifications

. . . For other articles on steels containing boron addition agents, see The Iron Age issues of Nov. 19, 1942; Feb. 4, 1943; March 25, 1943; July 1, 1943; Aug. 19, 1943; and Oct. 14, 1943.

THE Ordnance Department has drawn up specifications for five steels containing hardness intensifying additions, which, it is believed, will set the method for specifying all needled steels, not only in Ordnance Department practice but possibly commercially.

The method used is to specify base composition, plus intensifying addition sufficient to enable the steel to meet specified requirements in end quench hardenability, and in tensile strength and P value when quenched and tempered as specified. The type and quantity of intensifying additions are not indicated.

For example, a treated 1020 (10T20) specification calls for 0.15 to 0.25 C, 0.70 to 1.00 Mn, 0.040 max. P, 0.050 max. S, and normal Si; then further it calls for end quench hardenability of 40 Rockwell C 3/16 in. from end, and, after quenching in water at 1700 deg. F. and tempering at 425 deg. ± 25 deg. F., a minimum tensile strength of 175,000 lb. per sq. in. and a minimum P value of 95.

The P value formula is $\frac{T + 6R}{5}$ T being the tensile strength, lb. per sq. in., divided by 1000, and R being reduction of area, per cent.

The other four War Department specifications so far worked out, all of which are tentative, are:

10T45—0.40 to 0.50 C, 0.70 to 1.00 Mn, 0.040 max. P., 0.050 max. S, normal Si; end quench hardenability of 50 Rockwell C ¼ in. from end; and, after quenching in oil at 1550 deg. F. and tempering at 425 deg. F., a tensile strength of 250,000 lb. per sq. in. and P value of 95.

10T65—0.60 to 0.75 C, 0.80 to 1.10 Mn, 0.040 max. P, 0.055 max. S, normal Si; end quench hardenability of 55 Rockwell C ⅜ in. from end; and, after quenching in oil at 1500 deg. F. and tempering at 900 deg. F., a tensile strength of 160,000 lb. per sq. in. and P value of 90.

94T20—0.15 to 0.25 C, 0.80 to 1.10 Mn, 0.040 max. P, 0.050 max. S, 0.40 to 0.60 Si, 0.20 to 0.40 Cr, 0.20 to 0.50 Ni, 0.08 to 0.15 Mo; end quench hardenability of 40 Rockwell C ¼ in. from end; and, after quenching in oil at 1700 deg. F. and tempering at 425 deg. F., a tensile strength of 175,000 and P value of 95.

94T40—0.35 to 0.45 C, 0.90 to 1.20 Mn, 0.040 max. P, 0.050 max. S, 0.40 to 0.60 Si, 0.20 to 0.40 Cr, 0.20 to 0.50 Ni, 0.08 to 0.15 Mo; end quench hardenability of 50 Rockwell C ¾ in. from end; and, after quenching in oil at 1550 deg. F. and tempering at 425 deg. F., a tensile strength of 235,000 lb. per sq. in. and P value of 9.

These specifications, and, particularly, the exact figures for P values and Jominy requirements, are tentative and will be changed, after sufficient tests have been made, to conform to those found to be commercial. It is also likely that the manganese ranges will be increased as a means of accentuating the effect of the special addition agent.

Needled steel specifications have not yet been used by Ordnance except for experimental work. Parts which at present contain such steels are specified to meet certain proving specifications, with setting of material specifications left to the parts supplier.

The British system for specifying needled steels is to require, in addition to base composition, merely a certain hardenability. However, in practice, plant metallurgists conduct further tests before passing judgment on use of particular lots, so that in effect a method similar to that proposed by the Ordnance Department, but less formalized, is used.

Ordnance is not particularly enthusiastic about needled steels of low manganese content, since the effect is to make them no more than equal to 9400 steels. A higher manganese content steel (1.00 to 1.30 or 1.35 to 1.65), however, since it can be treated to equal a 4100 to 4300 steel, is considered well worth while. A treated 9400 will equal, at a minimum, a 4300 steel.

Two interesting development programs are now being conducted on the characteristics and application of needled steels. These are primarily intended as experimental, but each program involves the use of considerable tonnage for production work.

One program is sponsored by the Caterpillar Tractor Co. and the second by Army Ordnance Department. The first involves a series of nine heats made by Republic Iron and Steel Corp., Youngstown Sheet and Tube Co. and Carnegie-Illinois Steel Co. and although primarily intended for development and production work by Caterpillar there will be a certain quantity of each heat set aside for laboratory testing and small scale production testing by a number of interested companies and agencies. Some of these tests will involve parts of Ordnance material and in addition a small quantity will be tested at Ordnance arsenals for various applications. The Ordnance Department is closely coordinated with the American Iron and Steel Institute Committee and the S. A. E. War Engineering Board Iron and Steel Committee in these tests and it is expected that a great deal of useful data will be obtained. Considerable experimental work on ingots from these heats is being carried on by GMC Truck and Coach, Buick and Chevrolet Motor of General Motors Corp. (See THE IRON AGE, Oct. 14, "Special Addition Agent Steels") Timken-Detroit Axle Co., International Harvester and many others.

The second program, sponsored by

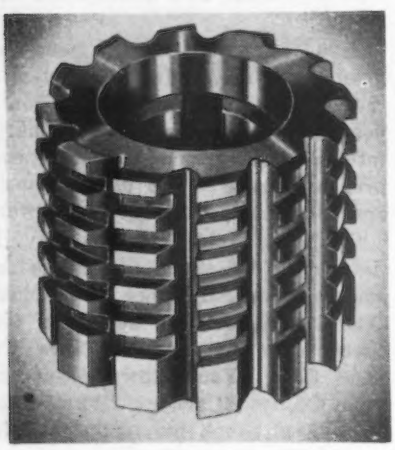
(CONCLUDED ON PAGE 168)

New Equipment . . .

. . . Small Tools

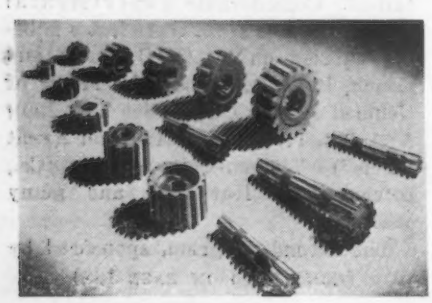
Recent developments in small tools and accessories are described in the following pages.

A COMPLETE line of multiple thread milling cutters featuring the Higbee cut is now available from the *Plan-O-Mill Corp.*, 1511 East Eight Mile Road, Hazel Park, Mich. The Higbee cut on these Multi-Millers removes the imperfect thread or feather edge at the same time the thread is milled. The line is available in National, Whitworth, Acme, V and special forms, with straight or spiral flutes, either ground or unground, in a range of sizes for use on any type of thread milling machine.



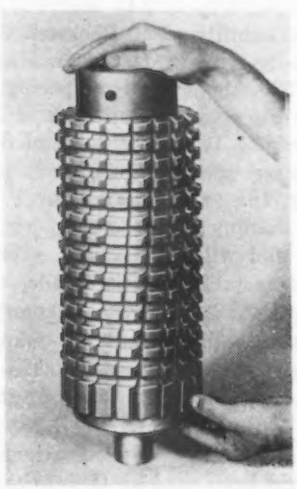
Milling Cutter Blanks

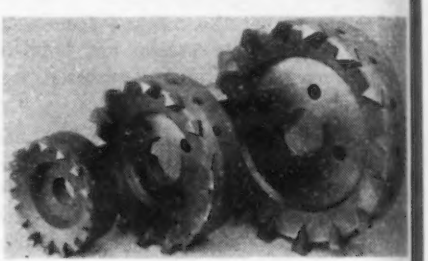
TO speed delivery and simplify ordering of multiple thread milling cutters, *Detroit Tap & Tool Co.*, 8432 Butler, Detroit 11, has developed a line of standardized thread milling cutters. Blanks for such standard sizes are now carried in stock, finish-machined and heat-treated, ready for finish grinding of threads. In ordering, it is necessary only to specify the blank number and thread specifications desired. Blanks are then threaded to individual specifications. Included in the line are 1½ to 3½ in. diam. shell and ¾ to 1½ in. diam. shank type cutters.



Thread Milling Cutters

ONE of the largest multiple thread milling cutters ever produced is offered by the *Plan-O-Mill Corp.*, 1501 East Eight Mile Road, Hazel Park, Mich., for threading gun tubes, breech blocks and other internally and externally threaded parts up to 16 in. in diameter. The cutter is 12¾ in. long and 6½ in. in diameter. It also provides the Higbee cut, by which the imperfect thread is removed coincidental with milling the thread. *Plan-O-Mill* has solved the problem of producing such a large forging with the necessary uniform hardness by segmenting the cutter. This has the further advantage of providing a spiral cutting action for smoother milling and improved work finish. In threading gun tubes, these cutters are used for rough, semi-finish and finish cuts.





Face Mills

KNOWN as the Tri-Bit, a new type of cutter blade has been applied to face milling cutters by *Weddell Tools, Inc.*, 1239 University Avenue, Rochester, N. Y. Triangular shaped adjustable tool bits are securely locked in a V-shaped hole in a heat-treated cutter body by a single lock screw. The cutter body is tied together all around the blade. Each Tri-Bit is backed up by a single adjusting screw, permitting minute adjustment of the cutter blade. The face of the cutter body is dished, which in combination with the triangular blade forms a chip space that expands in size away from the cutting edge in direction of chip flow. The face mills are made with three different sizes of Tri-Bits for cuts up to ¼, ½ and ¾ in. in depth.

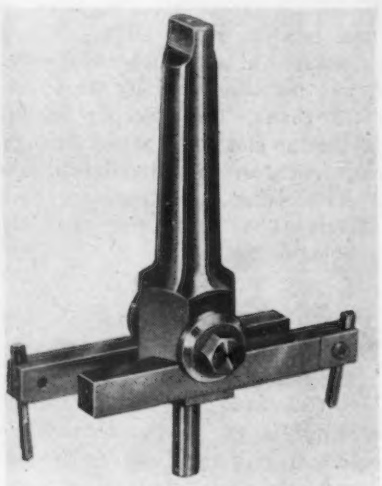
Boring Bars

MIKRO-LOK boring bars, used for finishing cuts, are especially adapted to boring a shoulder or the bottom of a hole and for making intermittent cuts, according to the *Universal Engineering Co.*, Franken-

muth, Mich. The blade protrudes beyond the end of the bar. Within the bar is a micrometer adjusting dial by which the blade can be set and locked to very close limits. The bars are available with taper shanks for Swiss jig boring machines and Morse taper shanks, straight shanks and a variety of flanges for diamond boring machines.

Adjustable Fly Cutter

AN adjustable fly cutter for cutting holes or disks in metals of thicknesses up to 1 in. has been announced by the *Robert H. Clark Co.*, 3424 Sunset Boulevard, Los Angeles 26. Generous clearance between work and the body of the fly cutter makes possible deeper cuts with less strain on the



tool. It is obtainable with straight or tapered shank and covers expansions of 4 to 10 in. in diameter, including all decimal or fractional intermediate sizes.

Carbide Milling Cutter

A CARBOLOY tipped milling cutter which has a cast-alloy body and contains the minimum number of flutes necessary for the specific work it is to do has been built by *Super Tool Co.*, Harper Station, Detroit. These cutters are made in diameters of 3 to 8 in., with 4 or 6 flutes for cutting cast iron, brass, bronze, copper, aluminum, magnesium and plastics. From 6 to 16 flutes are used in milling steel, the number of flutes depending upon the diameter of the cutter.

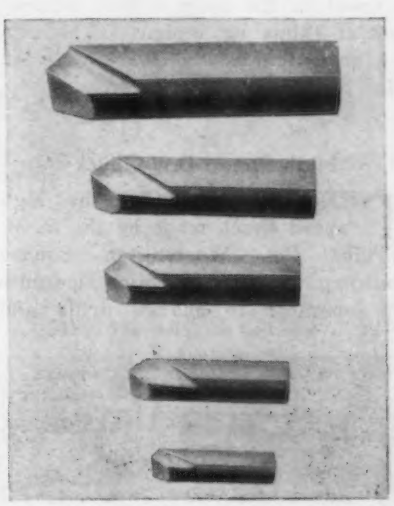
Milling Machine Attachment

BULKY work requiring only a light cut can be handled on a Bridgeport milling machine when a

Hoover-Riser has been installed, according to *Hoover Tool & Die Co.*, 20555 Hoover Road, Detroit. Recessed and drilled to fit this standard machine, the vertical surface plate becomes an integral part of it and increases the over-all capacity 6 in.

Carbide Boring Tools

A LINE of solid round Kennametal tools already ground ready for immediate use in precision boring machines is announced by *Kennametal, Inc.*, 144 Lloyd Avenue, Latrobe, Pa. Heretofore, a series of solid round blanks only were supplied. Style 275R tools have a side cutting edge angle of 30 deg. and an end cutting edge angle of 38 deg., for use in a 30 deg. boring bar. Style 295R tool



angles are 45 and 53 deg., respectively, for use in a 45 deg. bar primarily. Five sizes are available in each style, 3/32 to ¼ in. diameter. Tolerances are held to +0.000 and −0.001 in. on the diameter, and to +0.000 and 0.005 in. on all other dimensions.

Cemented-Carbide Rotary Files

THE addition of six new tools to their standard lines of cemented-carbide rotary files has been an-

nounced by *Carbur, Inc.*, Lincoln Park 25, Mich. All of these tools have cutting teeth ground from the solid. As they provide a sharp cutting edge over a long period of time, they reduce burring time per part and increase efficiency in burring operations. The tools can be run at much higher speeds than have been possible with high speed steel rotary files.

Carbide Tipped Reamers

AVAILABILITY from stock of standard sizes of carbide tipped reamers with hardened shanks is announced by *Tungsten Carbide Tool Co.*, 2661 Joy Road, Detroit 6. The line comprises both straight and tapered shank varieties, with sizes ranging from ¼ to 1½ in. Up to 1 in. the reamers come in steps of 1/32 in., while above 1 in. the diameters

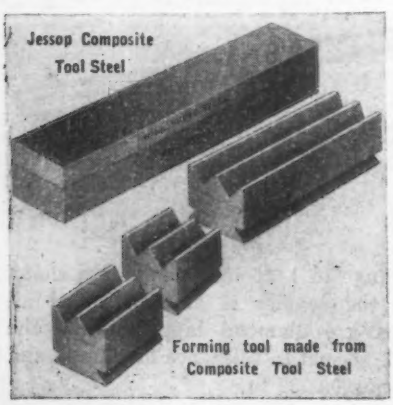
change to 1/16 in. The entire shank of the reamer is hardened, and all tips are diamond lapped, while the o.d. is held to tolerance of plus 0 and minus 0.0003 in.

Tangent Radius Dresser

WITH the horizontal type dresser offered by *Perfex Gage & Tool Co.*, 3609 Gaylord Avenue, Detroit, it is possible to dress the wheel at the bottom, thus allowing the wheel dressings to be thrown away from the dresser into the dust collector, rather than down onto the dresser. To assure location of the diamond on center, the diamond tool shank has two 90-deg. flats ground on it which fit a 90-deg. V in the mount block. It is claimed that it is possible to dress a 0.050 in. radius to a full half circle. By using a gage block setup, a direct reading from the base to the diamond can be obtained. A sine bar can be used to insure accuracy of angles that the ordinary vernier cannot calibrate. All moving parts are made from hardened steel ground and lapped to a perfect fit, with all surfaces protected from rust.

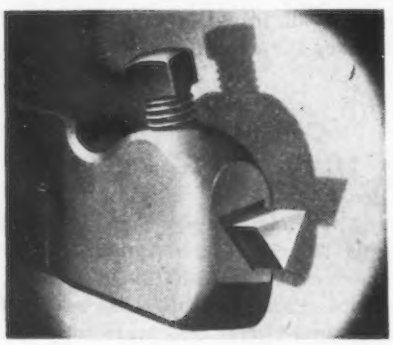
Composite Steel

SAVINGS of high speed and other alloy steels ranging from 50 to 80 per cent per tool are said to be possible through the development of a composite steel by the *Jessop Steel Co.*, Washington, Pa. It consists of a section of alloy steel continuously and permanently bonded to a backing of mild steel. The proportions of the alloy section are controllable. Illustrated is a composite tool steel in bar form which has been machined to specifications for a forming tool. It is then cut into the desired lengths for individual tools The machining is all done on one piece at the same time.



Tool Bits and Holders

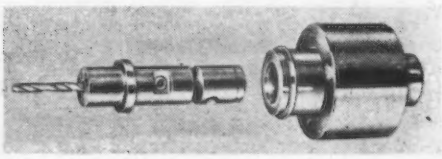
THE cutters put on the market by the *Triangle Tool Co.*, 2104 East 22nd Street, Cleveland, feature triangular-shaped bits which are held by a triangular seat in the tool holder.

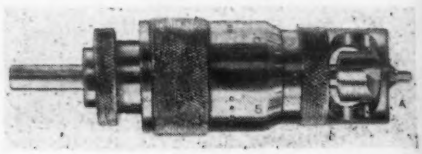


Four grades of high speed tool steel bits and three standard model tool holders are available in all regular sizes. Large and small tool bits may be used in the same holder without special shims or wedges. The bits are chromium plated for long wear life.

High Speed Drill Chuck

THE Centrif-O-Matic, the high speed chuck made by the *R. M. Wright Co.*, Washington Square Building, Royal Oak, Mich., permits the operator to change drills and other tools while the motor is running. By sliding back an outer sleeve on the chuck a centrifugal lock is released and the tool and its adapter may be removed and a new tool inserted. Drill adapters are available to accommodate drill sizes from 1/16 to 1/32 in., letter drills from A to K, and wire drills from Nos. 1 to 60.



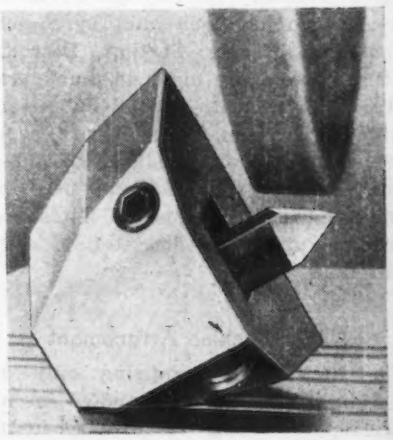


Micrometer Stop Countersink

BASED on the principle used in engine valve spring design, a split keeper which gives positive set to the retainer collar on bearings is incorporated in micrometer stop countersinks manufactured by *Aero Tool Co.*, Burbank, Cal. Keeper inserts work on the slotted, taper shaft principle. All force is directed toward the shaft center under constant, even pressure. The unit may be disassembled by hand.

Grinding Fixture for Bits

FOR grinding both 60 and 29 deg. threading tool bits, *Robert H. Clark Co.*, 3424 Sunset Boulevard, Los Angeles 26, has introduced a thread-tool grinding fixture that has no graduated scales or moving parts. It is especially adaptable for use with a magnetic chuck, although it can be easily clamped to the work table. The special tool bit holders will hold round or square tool bits in sizes from ⅛ to ⅝ in. for cutting both right and left hand threads. Correct side clearance is provided for, and all bits may be ground with or without rake on the cutting face. The fixture may be used on any surface or cutter grinder.



WE NOMINATE FOR GLORY

Gentlemen, he's tired. This patient and venerable creature is the most overworked piece of machinery in the world. For countless centuries the old one-horsepower hay burner was the most efficient engine we had, and he has done much of this world's work.

Today, aeronautical engineers have packed a horsepower into a few ounces of metal, and more than 2,000 horsepower into a single engine. Tolerances are measured in thousandths of an inch, and bearing smoothness is measured in millionths.

There's a reason for such precision as this. Into the cylinders of that finished engine will pour a torrent of 15-ton explosions at the rate of hundreds of blasts every second during the million miles of flight that is the life expectancy of the engine.

And that, brother, is horsepower!

Today, Jones & Lamson machine tools, engineers and service men will be found on every airplane engine production line in America, helping to make possible this miracle of power . . . They are at your service. Call upon them now.

Universal Turret Lathes . Fay Automatic Lathes . Automatic Thread Grinders . Optical Comparators . Automatic Opening Threading Dies

JONES & LAMSON MACHINE CO., SPRINGFIELD, VERMONT, U.S.A.

Profit-producing Machine Tools

Assembly Line . . . STANLEY H. BRAMS

• Automotive engineers specify expectations for post-war cars, immediate and long-range . . . Big expansions are indicated by G. M. for post-war . . . Civilian truck program is given top priorities and higher output quotas.

CLEVELAND—Most of the automotive industry's big news came from Ohio last week. A special materials meeting of the Society of Automotive Engineers and a virtually unprecedented gathering of General Motors executives at Cleveland developed exceedingly pertinent industry thinking.

Probably the most thoughtful and certainly the most soundly grounded analysis yet presented on post-war automotive engineering planning was that one unfolded at the S. A. E. meeting by A. T. Colwell, vice-president of Thompson Products, Inc. Both near and long term anticipations were outlined, developed with the aid of 81 top automotive officials.

"Steel will likely be the body material, because of its physical properties, safety and price," said Mr. Colwell. "Aluminum sheet must sell at six cents per lb. to compete with steel—the price will probably be three times this." He anticipated, however, that aluminum castings made of secondary metal could compete with iron castings, indicating possible uses as transmission cases and differential housings, and possibly for cylinder heads, crankcases, intake manifolds, wheels and many small castings and brackets.

With post-war fuels likely to be only about two octane numbers above pre-war levels, immediately higher compression ratios in motors are unlikely, said the speaker. But he anticipated long term advances in compression ratios, perhaps to a level of 8.1 to 1, along with widened use of higher octane gasolines. Chief deterrent to increases in octane ratings was said to be cost of blending agents—15c. per gal. for alkylate, 30c. for aromatics, others, $1.00 or more.

Mr. Colwell mentioned triptane, the newly developed fuel agent, and said its use was not anticipated for the near future; its cost now is close to $1.00 per gal. Triptane with 3 cc. of lead, however, was said to be a powerful fuel "to be investigated in long range research."

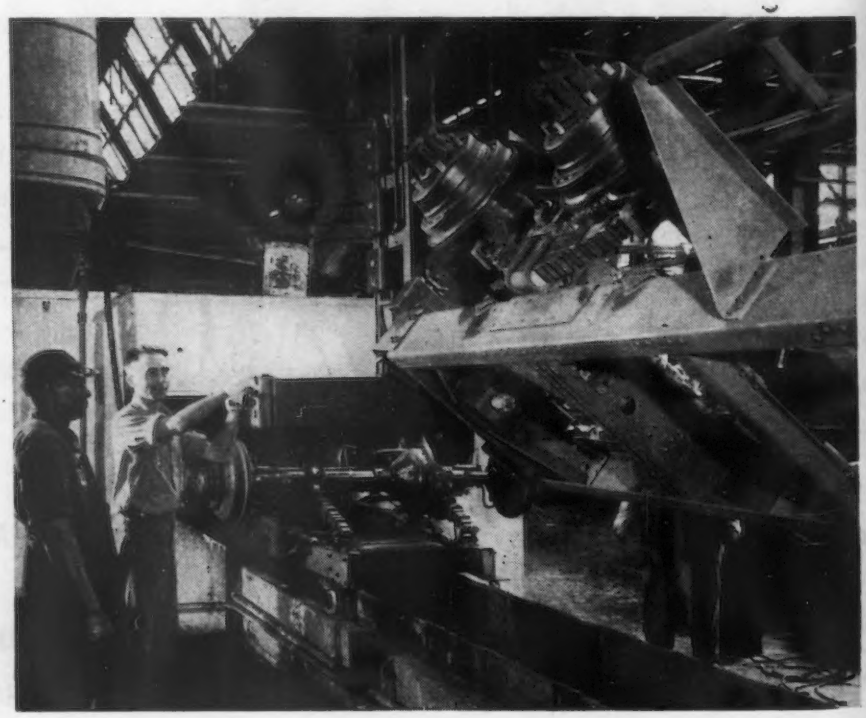
A better means of achieving more miles per gallon, Mr. Colwell felt, is by lowering rear axle ratios. Though this sacrifices performance at low speed, a chart prepared by Olds engineer H. T. Youngren established startling economies by such a step. At 50 m.p.h., this chart showed, approximately 23 miles per gallon can be obtained with a 3.0 rear axle ratio, against less than 16 miles at a 4.6 ratio.

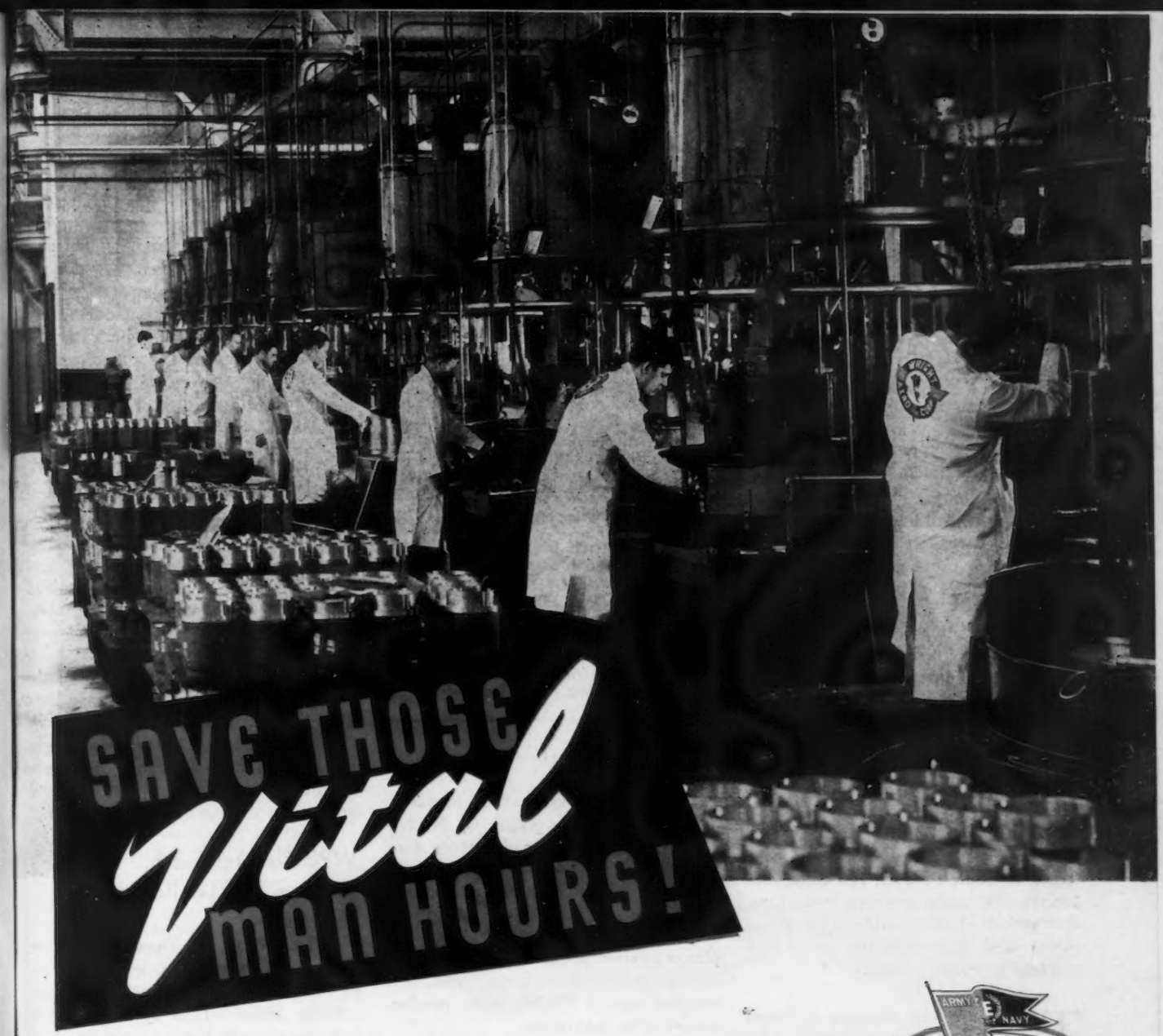
Automatic transmissions were expected to play an important part in future car development. Infinitely variable transmissions were reported theoretically desirable, but not as satisfactory as drives used today insofar as the present state of the development goes.

Fuel injection may quite probably be used on trucks, but "does not offer a means to economy on automobile engines, particularly at low load factors."

OTHER sections of the Colwell paper forecast probably stiffer crankshafts; improved aircraft type bearings with thin soft metal coatings plated on suitable backing material; sodium filled valves on heavy duty engines; possible chrome plating of piston rings; new designs for fuel systems to keep lines cooler and prevent vapor lock; new designs for combustion chambers to reduce tendencies toward pre-ignition and roughness; probably 25 to 30 miles per gal. for medium size cars, even at the sacrifice of performance; the likelihood of lighter cars, although the European small car type is not foreseen; marketing of some cars in two models, one for performance and one for economy; the probable use of supercharging for heavy duty vehicles; probable

TURNOVER HOIST: Studebaker utilizes a semi-automatic hoist which moves with the conveyor chain to raise and invert partially completed chassis of military trucks. The hoist will lift and rotate the chassis through 180 deg., then lower it again to the conveyor. The machine extends or contracts to fit any chassis length.





BULLARD

Here are 10 Bullard Mult-Au-Matics, each having 8 spindles. 80 of these are doing their share for the war effort working on airplane engine parts. Of course, 10 of the total number of stations are loading stations, but the 70 are finishing their operations every few seconds. Each station has independent feeds and speeds, and all operate simultaneously. As fast as the operator can load and the machine indexes, there comes out a finish machined piece.

Hundreds of such batteries of Mult-Au-Matics in plants all over this country and in those of our allies are every day beating Hitler and the Japs to the punch.

These machines are mechanical soldiers of Industry, and Bullard is proud that other War Industries have accepted them for their accuracy, stamina and all-out production.

The Bullard Company

BRIDGEPORT 2, CONNECTICUT

use of pressure cooling; and a general manufacturing objective of producing with fewer manhours of work, inasmuch as under present conditions medium size cars would cost at least 15 per cent above pre-war levels.

One session of this meeting discussed plastics as engineering materials, keynoted by a paper by W. F. Bartoe and Dr. D. S. Frederick of Rohm & Haas Co. Against the background of this paper, the engineers were interested in plastic displays by a number of companies. Notable were large constructional sections by Bakelite.

The day's third paper, by P. N. Torrance of Firestone, dealt with synthetic rubber progress. Synthetic passenger car tires of today were said to be satisfactory, capable of delivering performance almost equal to best pre-war tires at reasonable speed, although tire industry belief, expressed outside the meeting, is that synthetic tires fail rapidly at high speed levels.

The speaker said uses for synthetic rubber were expanding rapidly, indicating an enlarged post-war use even when natural rubber is again available. As possible utilizations, such mechanical goods were mentioned as radiator hose, fan belts, motor mounts, seals, gaskets, insulators, dust covers, channel rubbers for windshield and door edgings, etc., and windshield wiper blades.

THIS sparkling meeting followed by a day a luncheon tendered by the Cleveland Chamber of Commerce to a rarefied stratum cross-section of G.M. management. Chairman Alfred P. Sloan, Jr., indicated the scope of the corporation's post-war thinking by revealing that the General Motors reconversion investment will be about $250,000,000.

Against normal productivity of 4 000,000 cars a year before the war, Mr. Sloan anticipated industry production for three or four post-war years at least 50 per cent above previous levels, around 6,500,000 cars annually. The Electro Motive Div. of the corporation, he reported, already has a backlog of considerably over $100,000,000 for locomotives.

At another point in his incisive analysis, the General Motors chairman said that, "Strange though it may seem, the facts are that from the standpoint of today's technology, the greater part of the American industrial system is obsolete. It could be rebuilt, and there is a wonderful opportunity to do that very thing if we will step up and take the responsibility."

C. E. Wilson, corporation president, reported that at present G. M. has some 75,000,000 sq. ft. of factory floor space and around 465,000 employees in 46 cities. War shipments, he said, are now close to $12,000,000 daily; the corporation is now operating 112 plants against about 90 in the pre-war period. Payrolls are near peak, and will not exceed 500,000 when production reaches maximum.

Ford Plans Post-War Cargo Plane Output

Detroit

• • • Ford Motor Co. is planning to enter the cargo aircraft business after the war, Henry Ford said late last week. He declared output will be undertaken at Willow Run, saying that his company had first option on the plant for postwar use, and plans to take it up.

Mr. Ford said engineers and officials, including Charles A. Lindbergh, had been obtaining data on big cargo-passenger planes for months. He indicated the company has been experimenting with high altitude engines for such installations, and has also developed small airframe models. Objectives of the experimentation, he said, were planes requiring comparatively short runways, operating at low costs, and including important safety factors.

A SHARE of last week's automotive news budget came from Washington, where WPB quadrupled the 1944 civilian truck program. Authorized output was advanced to 123,492 units from an already authorized 33,852. These will be produced under a single schedule of requirements of all claimant agencies; its importance is indicated by the fact that it has been accorded manufacturing priority ratings equal to aircraft and high octane gasoline. Further increases will likely come later.

This program also includes requirements for construction and farm machinery, general industrial equipment and other uses which may require the same general type of axle transmissions and engines as trucks—these three components being the bottlenecks. Probably about two-thirds of the 123,492 units will be actual domestic highway trucks. The program also reserves facilities for critical component replacement parts, probably ranging between 3 and 8 per cent of spare requirements for the axles, transmissions and engines.

During the first six months of 1944, output will be confined to existing facilities only, indicating low levels of volume. But expansions will be developing simultaneously, making possible enlarged production during the last half of the year. Indicative of this expansion was the announcement last week by General Motors that its Saginaw Malleable Iron Div. will build and equip a plant for DPC near Danville, Ill., to manufacture malleable castings for heavy truck axles. Employment will approximate 500 people when full volume is reached.

The truck allocations to individual companies represented increases over previously awarded quotas although reductions were evident in some sections of the list, due to inability of certain companies to meet even their original and smaller orders and turn out military requirements as well. The largest producers in order are Chevrolet, Ford, International and Dodge, the first two stepping quite definitely out of their civilian orbits to produce in the medium weight field.

WPB Revokes E-2-b, Cutting Tool Limitation

Washington

• • • WPB on Tuesday revoked Preference Order E-2-b, governing the production and distribution of metal cutting tools. This action possibly sets the pattern for the junking of all WPB limitation orders.

WPB feels that the controls contained in Priorities Regulation No. 1 in CMP and other general regulations will serve better in the present situation.

In revoking the order the WPB Tools Division called attention to inventory restrictions contained in Priorities Regulation No. 1. The regulation prohibits the acceptance of deliveries if the buyer's inventory will be increased above a "practicable minimum working inventory." The division stressed that the term "practicable minimum working inventory" is to be strictly construed.

While the requirement of the order that preference ratings be used in making purchases no longer applies, producers must still file rated orders ahead of any unrated orders that may be received.

All producers are requested by the Tools Division to continue to file monthly operation reports on Form WPB-39.

HELPING *To Win* AMERICA'S PRODUCTION BATTLE

by providing better, faster, more accurate threading

MURCHEY

Threading Tools

Type "B-M" Collapsible Machine Tap

Saves production time. Increases machine capacities. Insures instantaneous action. Gives greater accuracy of thread length.

4 WEEKS' DELIVERY

● Murchey self-opening dies and collapsible taps are speeding up production schedules on threaded parts for tanks, guns, bombs and shells. And by giving this extraordinary short delivery they are getting these schedules started much more rapidly. The record of these tools is outstanding.

Write for literature on type "C-O", type "G" and on our New Collapsible Machine Tap Type "B-M". Also for folders on Murchey Milling Machines, Shell Tapping Machines and Roller Pipe Cutting-off Machines. You need this literature for ready reference.

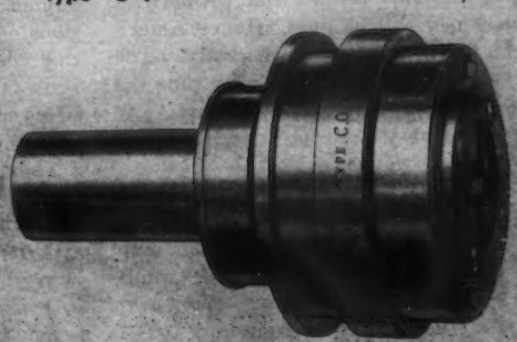
Address Dept. I

MURCHEY MACHINE & TOOL CO.
DETROIT 26, MICHIGAN

Type "G" (non-rotating) SELF-OPENING DIE HEAD—Designed and engineered for use on any machines where die heads do not rotate. Made in sizes from 7/16" up to and including 6".

●

Type "C-O" (rotating) SELF-OPENING DIE HEAD—a companion to type "G" for use on machines where the die head revolves. Takes the same chasers as well as many parts of type "G".



MURCHEY

Washington . . .

L. W. MOFFETT

• U. S. to "sell" post-war assistance to Russia . . . International currency proposed for foreign rehabilitation . . . Commodity exchanges believed difficult . . . Army to rebuild ports and facilities.

WASHINGTON — WPB Chairman Donald M. Nelson confirmed the fact that he had had conversations with the British and the Russians with respect to European reconstruction while abroad.

At a press conference on Nov. 10, Mr. Nelson said that his New York remarks quoting Marshall Joseph Stalin as willing to pay for American aid referred to assistance to Russia after the war, and not to Lend-Lease.

Mr. Nelson said:

"If selling a country something is giving assistance to a country, then you might say that we are going to assist Russia."

The question puzzling international trade experts outside of the State Department is "How are Russia and other countries going to pay?"

Obviously the scale of wages to be paid European labor after the war will be far below what American workmen will be paid. Hence American goods will be more costly. The cheapness of European labor plus the low cost of materials will force any goods sent to Europe to sell far below domestic prices.

A headache which is puzzling the State Department is how foreign exchange can be established not only with Russia but with all other countries which will be using their own production in reconstruction.

Several suggestions are being made for the solution of this knotty problem which is dizzying United States foreign experts. So far discussions are in the stratosphere about how payment should be made.

Some repayment proposals are: (1) Payment in gold from Russia and France; (2) loans in gold to pay for American goods; (3) commodity exchange or barter (this involves subsidies); and (4) commercial advantages.

Payments in gold and loans of gold to other countries to pay for our goods are both tied up with the possibility of reestablishment of the gold standard throughout the world with American supplies of the precious metal loaned to back foreign currencies. The public is rather likely to look with suspicion upon the loans because of the last experience with European countries as debtors.

NATURALLY, the proponents of international currency are having their inning. They point out that it will be difficult to establish exchange because Europeans will have little or nothing to export for four or five years after the war ends. International currency, they assert, would solve the problem of translating foreign imported goods into currency for use in this country, should payment in kind be decided upon.

The casuistry of this latter argument is apparent so far as manufactured goods are concerned. Manufactured goods can be ruled out, because it is believed that Europe will need all of its manufactures in the reconstruction period. Raw materials such as manganese, mercury and wood pulp from which newsprint can be manufactured are suggested as proper exchange commodities.

The real objection to payment in kind is that American prices would have to be subsidized to suit the bankrupted pocketbooks of European nations. Furthermore, the flooding of this country with foreign raw materials is bound to have a destructive effect upon producers in this country —taking manganese as an example.

Then, striking balances between the countries promises to be utterly impossible. This was the unhappy experience of South American nations with Germany, in connection with international barter. It was found futile to try to establish the relative cost of machine tools in terms of beef carcasses.

If the government seeks payment through the granting of commercial advantages in the post-war, trade experts fear that Europeans are too smart to agree to many important ones. The dispute with the British over airbases is an illustration.

PROPOSES LOANS FOR RECONVERSION: In an appearance before a Senate Military Affairs subcommittee, Attorney General Francis Biddle proposed creation of mechanism by which the government would make loans for reconversion to peacetime economy of any business "seriously embarrassed by the war."

Furthermore, the prospects of extensive imports of cheap foreign steel within 5 to 10 years after the war are considered excellent by foreign trade experts. These experts say that tariffs could not be erected high enough to keep this steel out of the country—or would not be because of the desire to prevent reciprocating trade discrimination by foreign countries.

An anti-dumping agreement would be the kind of commercial advantage this country could well use, but whether our State Department will insist upon it is another question.

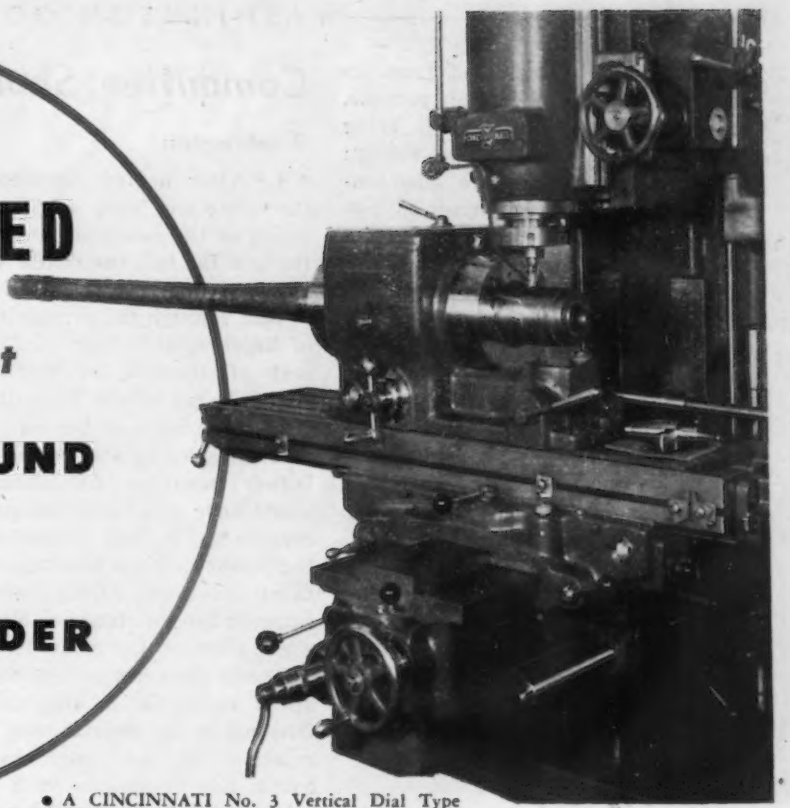
MR. NELSON said that the Army is assuming the responsibility for the reconstruction of port facilities in liberated or occupied countries.

Lend-Lease sources say that some

CORRECT CUTTER SPEED

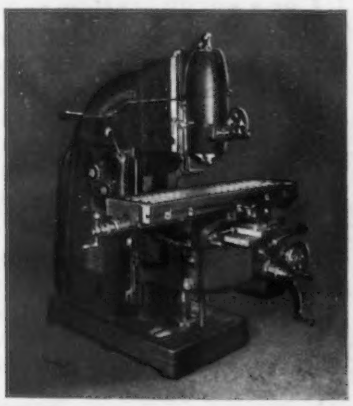
Selected without

WALKING AROUND OR "DUCKING" UNDER



• A CINCINNATI No. 3 Vertical Dial Type Milling Machine, equipped with a special power feed rotary milling work head. The operation consists of milling a circular recess on the part. This job was tooled up by CINCINNATI Service Engineers, who will be glad to draw upon their experience in solving your unusual milling problems.

THIS type of job, like many others in the average shop, requires a change in spindle speed (cutter speed) to obtain any semblance of production, finish and cutter life. The part requires a milled relief around the main diameter at the large end. A 1-13/64" diameter end mill, running at 188 r.p.m., mills the principal portion of the relief. This leaves too large a radius at the end of the cut, so it is then removed with a .407" diameter cutter running at 550 r.p.m.



• CINCINNATI Vertical Dial Type Milling Machine. The Dial Types are made in plain, universal, and vertical styles, Nos. 2, 3, and 4 sizes, medium speed and high speed ranges. Complete engineering specifications may be obtained by writing for catalog M-970-2.

With CINCINNATI Quick Change Collets, the cutters are changed in a few seconds, and with the exclusive Dial Type feature of power speed and feed change from the front operating position, the speeds are changed as desired in a few clicks of the speed dial . . . without taking a step.

This one Dial Type feature alone is worthy of your most serious consideration when selecting new milling machine equipment. There are a host of other Dial Type features, too, some of which are tabulated in Sweet's Catalog File for Mechanical Industries. All of them, along with complete engineering data, will be found in catalog M-970-2, a copy of which may be had for the asking.

CINCINNATI

THE CINCINNATI MILLING MACHINE CO. CINCINNATI, OHIO, U.S.A.

TOOL ROOM AND MANUFACTURING MILLING MACHINES . . . SURFACE BROACHING MACHINES . . . CUTTER SHARPENING MACHINES

steel has been transferred from its account to the Army for this purpose, but that most of the steel is being taken from the Army's own foreign supplies. The British are also contributing steel for reconstruction, but some of this may also come from American Lend-Lease, it is alleged.

Not more than a trickle of American Lend-Lease steel, about 5000 tons in the fourth quarter of this year, was transferred to the Army. But trade sources say that the Army is requiring much rail and track accessories. These same sources say that there are 150,000 tons of rail and turnouts at one lake port awaiting export to Europe.

While Mr. Nelson said that he did not have an opportunity to discover what Russian material distribution systems were, he said that they were superior to American attempts. He said that he saw no warehouses in Russia and no excess parts or material supplies around the plants and factories he visited.

When asked about strikes in Russia, Mr. Nelson said that he did not ask anyone about them. He did say though that most industries were working on a 66 hr., six day week, except heavy industry which worked 48 hr. a week.

Committee Shuns Post-War Reserves

Washington

• • • After having defeated part of the Army and Navy proposals on revision of the renegotiation portion of the new tax bill, the House Ways and Means Committee was itself defeated in part through the persuasive powers of Representative Carl Vinson, Democrat of Georgia, chairman of the House Naval Affairs Committee.

The proposals of his own subcommittee headed by conservative Wesley Disney, Democrat of Oklahoma, which would have given business practically everything it had requested, were badly mangled in a final session of the Committee last Friday, mainly because of the insistence of Mr. Vinson, who addressed the committee.

Except for court review the setting up of renegotiation standards to be followed by the departments, plus the creation of an interdepartmental board, the Committee in a wave of political jitters practically washed out the subcommittee's work.

Legislative experts predict that the measure, which bowed to the executive departmment's insistence on renegotiation before taxes, is headed for drastic revision by the Senate Finance Committee, headed by Senator Walter George, Democrat of Georgia. However, the strength of the conservative group in the Committee is in for a severe test, Congressional sources say.

The Ways and Means Committee, shied away from providing for postwar reserves. Under a nebulous provision the new bill would require the Government to consider "the potential financial burden to reconvert to peacetime operations" in final determinations.

Standard commercial articles were exempted from renegotiation in the "discretion" of the Price Adjustment Board, but only where competitive conditions have been restored. All interested departments had opposed the exemption, except the Army. The language accepted by the Ways and Means Committee is not expected to change PAB practice on such items.

The final and possibly the most important defeat industry suffered at the Committee's hands was the fact that no action was taken on the subcommittee proposal to eliminate retroactive features. Contracts on which payment or delivery had not been made before April 23, 1942, or before the effective date of other portions of the renegotiation law, remain subject to the law.

The number of contracts to be renegotiated was reduced mainly by exempting contractors whose annual business is less than $500,000. The present limit is $100,000. This would be effective on contracts entered into in 1943, or later.

•

• • • WPB Chairman Nelson indicated last week to the Murray Senate Subcommittee on War Contract Termination that all controversial questions on this subject should be referred to the Baruch unit of OWM. He urged that policies in connection with settling terminated war contracts be uniform as between the several war procurement agencies, that some central agency should act as a review and arbitration unit in cases of dispute as to claims, that "quick cash" for contractors on termination is "most important."

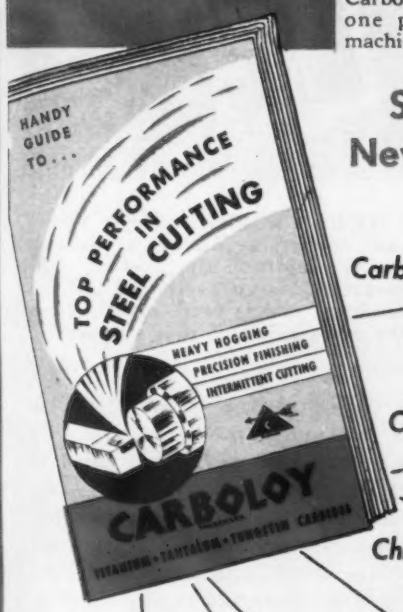
"The Redistribution Division of WPB is studying the problem of disposal of surplus war materials, both from the current and postwar viewpoints," he said. "The problem of distribution of raw materials does not present a serious question. What to do with unneeded semi-processed products is a more difficult problem."

THE BULL OF THE WOODS — BY J. R. WILLIAMS

ALL ALIKE! NO ORIGINALITY! NO INDUCEMENTS! JUST "MACHINIST WANTED"! DO I HAVE TO GET A NEW EMPLOYMENT STAFF?
WELL, WE CAN'T OFFER 'EM MORE MONEY, OR PICNICS EVERY DAY, OR TH' PRETTIEST GIRLS WORK HERE, OR--
WANTS 'EM TO ROB OTHER SHOPS IN A NICE WAY!
WELL, THEY MIGHT SAY "WANTED, MACHINIST HELPERS TO HELP MACHINIST HELPERS"
HEROES ARE MADE - NOT BORN
J.R. WILLIAMS
T. M. REG. U. S. PAT. OFF.
COPR. 1943 BY NEA SERVICE, INC.
11-19

Guide to Top Performance when Cutting Steel

Turning, boring, facing steel supercharger gears. Carboloy tools eliminate one pass; save 81% machining time.



Send for this New, Pocket-size Manual

Carbide Grade Selection

Correct Cutting Speeds

Chip Breaker Design

Tool Rakes and Angles

Machine Requirements

Use of Coolants

"Do's and Dont's" for Operators

For top performance when you cut steel with carbide tools ★ Cut at high speeds, in general, not less than 200 feet per minute ★ Use feeds not less than .010″ per revolution (for medium and heavy cuts), and preferably .015″ to .025″ ★ Fit correct chip breaker to each job (the ground-in, step-type is usually best) ★ If you use a coolant, provide heavy, continuous stream ★ Keep tools sharp (excessively dull tools cause breakage) ★ Use rigid set-ups; with minimum overhang, and part chucked firmly. These factors are particularly important for best results.

Important, too, is the type of carbide you select. Today, more than 60% of all Carboloy Cemented Carbide produced for machining purposes is used for cutting steel. In leading war plants throughout the nation—you find Carboloy tools giving top performance on all types of steel cutting, ranging from extra heavy jobs to light, high-speed precision finishing.

A new 16-page pocket manual on steel cutting, to help your plant get maximum results, is available free on request. In quantities, for general distribution; if desired.

CARBOLOY COMPANY, Inc., Detroit 32, Mich.
11153 E. 8 Mile Rd.

Birmingham, Ala. • Chicago • Cleveland • Los Angeles
Newark • Philadelphia • Pittsburgh • Seattle • Thomaston, Conn.
Authorized Distributors: Canadian General Electric Co., Ltd., Toronto, Canada.
Foreign Distributor: International General Electric Co., Schenectady, N.Y.

TUNGSTEN CARBIDES for Cutting CAST IRON and Non-Ferrous Metals

CARBOLOY

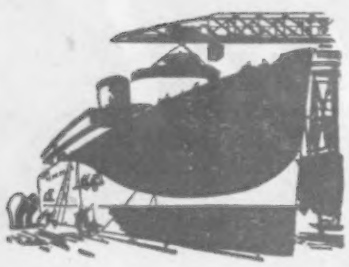
(TRADEMARK) CEMENTED CARBIDES

TITANIUM TANTALUM CARBIDES for Cutting STEEL

FOR HEAVY HOGGING • • • PRECISION FINISHING • • • INTERMITTENT CUTTING

WEST COAST . . . OSGOOD MURDOCK

• As many Lightnings a day as were made in a month two years ago . . . Army Ordnance contractors solve manpower problems . . . Open hearth scrap users urge segregating out tramp alloys.



LOS ANGELES—So abruptly and significantly did aircraft production jump upward in October after several months of discouraging ground loops that major aircraft manufacturers don't want to break a winning combination. Therefore, apparently, the long and widely discussed 10 hr. day and five-day week, so highly recommended by WPB's aircraft production high command, seems destined to slender acceptance. Last week Northrup, with less than 10,000 workers, made the change and adopted the two daily shift practice. North American pioneered the plan.

But on the other hand, President Harry Woodhead of Consolidated Vultee told THE IRON AGE last week, "We do not contemplate going on the 10 hr. shift basis." Lockheed-Vega has also indicated that it will not change its shifts. Douglas already announced a rejection of the suggestion, at least temporarily.

Lockheed at Burkank announces that its new *daily* production quota of P-38 Lightnings is now greater than the *monthly* output at the time of Pearl Harbor. This accelerated production is being achieved by concentrating most of Lockheed's own facilities on final assembly and subcontracting component parts, except the intricate fusilage, forward booms and tail surfaces. Plants of Consolidated Vultee at Nashville, Tennessee and Downey, California will build leading and trailing wing edges, aft booms, power plant installations and wing center sections, and eventually complete Lightnings will be assembled at Nashville. The accelerated program trebles present production and will be achieved without interruption of schedules. Only half the manhours are now required to build a P-38, compared with those needed to build the 300th plane.

Consolidated Vultee reports that more four engined bombers were produced in October by its San Diego division than ever had been produced by an aircraft company in one month. Production efficiency indices of WPB are said to show also that Liberator output in terms of airplane pounds per employee per day was 30 per cent greater at San Diego during the past four months than that of any other manufacturer of heavy bombers. Production of these planes increased 70 per cent during the 10 months of the current year despite a 17.6 per cent less in production workers. Manhours necessary to build a Liberator have been reduced 30 per cent in the past ten months, on top of a cut of approximately 60 per cent in 1942.

At Seattle President P. G. Johnson of Boeing stated that production of Flying Fortresses for October "set a new all-time record." The company is now openly preparing to produce the long hushed B-29 super-bomber at Renton.

DESPITE persistent rumors, calamitous predictions and dire apprehensions, Army Ordnance procurement officers declare that only an insignificant number of contracts have been cancelled or moved to other areas because of Pacific area manpower shortage. Contracts continue to be placed or renewed in accordance with procurement needs, and whatever terminations or adjustments have been made are held to have resulted from rescheduling and orderly revisions in line with national policy. Moreover, ordnance contractors have maintained schedules and more deliveries have been ahead of schedule rather than behind.

Colonel Dean Witter who has served for nearly two years as deputy chief of the West Coast Ordnance District comprising nine states from the Rocky Mountains west is being transferred to Washington where he will be in charge of all contract terminations for Army Ordnance.

When President K. T. Norris of the Norris Stamping & Mfg. Co. was appointed a member of the President's new advisory council of business men, the select and supposedly influential right wing kitchen cabinet just created, his West Coast friends were both surprised and happy that he should so soon have received this outstanding national recognition. Although he seems to be listed as of Chicago, his remarkable rise has been at Los Angeles and his principal operations are in southern California. His company has been one of the most successful in drawing shell cases out of steel discs and in outstanding production management.

CAPTURED ROCKET: Three American soldiers examine a German rocket captured in Sicily. The rocket is known as the 32 CM. incendiary, and is fired directly from the crate in which it is shipped.

SCRAP segregation and the control of tramp alloys and non-ferrous metals in steel scrap present special regional difficulties and peculiar problems on the West Coast. Almost overnight new major industrial producers have grown up, without past training and experience in the orderly segregation and handling of scrap material. Moreover, there is no local market nor demand for nickel, stainless steel

FOSDICK

flexibility proves a real asset

• "One of the best of all the Radials we have," that's how the foreman of a well known manufacturer of grinding machines feels about the Fosdick Hydraulic Radial illustrated.

Two set-ups are required to perform all the operations on this cast iron Table Traverse Apron. A jig is used for locating holes on four sides of the work and a clamp on the work table is used for holding piece for remaining operations.

Following are operations performed:

Drill and tap — 11 holes 5/16" and 18⅝" holes.
Tap 17 holes — other sizes standard thread.
Tap 2 holes — ⅜" pipe thread.
Ream 1 hole 1" dia. — 2 holes ½" dia.
1 hole — drawback spot face.
1 hole — spot face.
5 holes — counterbore.

The foreman also says "Heavy ball-bearing spindle is very accurate — centralized controls provide all necessary operating speeds — large diameter column and arm section prevent deflection."

If you want flexibility of operation — continued accuracy — ease of operation — and low costs, put your radial jobs on a Fosdick Hydraulic Radial.

Our bulletin Fosdick Hydraulic Radials R.I. gives complete details. Write for yours.

ARMY E NAVY

FOSDICK MACHINE TOOL COMPANY
CINCINNATI ... OHIO

and other alloy scrap, to bring the incentive prices which in other areas automatically provides for careful segregation. As a result the salvage division of the WPB has relaxed in this area the provisions of Order M-24-c and has notified scrap producers that it will not be necessary to segregate for alloys and non-ferrous. Some steel foundries are not particular.

West Coast open hearth operators find that residual copper and nickel in carbon steel heats has increased to an alarming degree. Heats have been rejected, even for ordinary rolling stock. For welding quality and specification steel, and specially for welding rod, it is now often found necessary to select special scrap for heats.

Within the past year, West Coast mill scrap buyers accepted direct from military sources considerable shipments of demolition and battle field scrap from the Pacific area, without segregation or preparation. In one lot of 5200 tons as high as 200 tons of non-ferrous, stainless and alloy steels were found.

Columbia Steel Co. is carrying a schedule of special full-page advertisements urging the segregation of scrap by producers. Mill buyers are urging scrap dealers and industrial producers to cooperate in this respect, to segregate turnings, to separate materials in fabrication and to introduce more orderly salvage methods.

As a primer, and before the new rolling mills generate sufficient home scrap to balance open hearth production, a stockpile of 15,000 to 25,000 tons of steel scrap is being accumulated at Geneva, Utah for the big new DPC plant that will be producing within the next few months. The management expects to secure approximately 6000 tons from intermountain sources near at hand. From 9000 to 19,000 tons are being bought and shipped from the Pacific Northwest where scrap at present is plentiful and has been selling below the OPA ceiling.

It is generally understood in the trade that the new Oregon Electric Steel Rolling Mills at Portland have been down, at least substantially, and that sale of at least part of the 10,000 to 15,000 ton high grade scrap stockpile there will further cushion any possible West Coast shortage during the coming months.

Ironton No. 2 furnace, the 900 ton stack which DPC moved from Joliet, Illinois to Geneva, Utah and which was erected and is being operated by Columbia Steel Co. has also been down and has so far not consistently produced the pig expected of it. As a result there has been for past weeks a temporary scarcity of pig on all far western markets except southern California where foundries and merchant buyers have been able to secure limited quantities from Fontana.

Steel Plant Nears Completion in Brazil

Rio de Janeiro

• • • **About 14,000 workers are employed on the new $65,000,000 Volta Redonda steel plant project. Nearest completion now is the coke plant with 55 rows of coking chambers. The plant is militarily important because of the coke, used in foundries, and its by-products: Toloul for TNT, xylol for explosives, benzol for motor fuel and others.**

An eight-ton coke-pusher made in the United States has been installed, and workers are finishing the jig-saw puzzle assembly of tons of odd-shaped refractory bricks. All the special bricks and silica clay for the mortar are coming from the United States.

Located on the main line of the Brazilian Central Railway, between Rio de Janeiro and Sao Paulo (Brazil's Detroit), Volta Redonda will provide the structural beams, tracks and plates that Brazil needs.

o o o

Ore Miners' Travel Time Under Dispute

Washington

• • • **The settlement** of portal-to-portal pay for iron ore miners which seemed to be a surety 10 days ago is again unsettled. The Supreme Court has now agreed to hear arguments in the matter brought about through two lawsuits now on file with lower courts. The decision is expected to set a precedent for the coal miners.

One suit in which the Tennessee Coal, Iron & Railroad Co. is a principal is already on file and another is to be filed this week by the Jewel Ridge Coal Co. at Abingdon, Va.

The controversy exists over whether the phrase "work-week" can be interpreted to mean all time spent underground. The Circuit Court's opinion interpreted it to mean all time spent underground except the lunch period but exclusive of time for checking in and out and getting or returning tools.

Operators of 13 iron ore mines and a number of captive coal mines in Alabama, including Tennessee Coal, Iron & Railroad Co., Sloss-Sheffield Steel & Iron Co., and Republic Steel Corp. have asked for a declaratory judgment freeing them from paying portal-to-portal pay.

. . . Cited for Awards . . .

• • • **The following companies** have been awarded the Army-Navy "E" for outstanding production of war materials.

American Foundry Equipment Co., Mishawaka, Ind. (white star).
Charles T. Brandt, Inc., Baltimore (third star).
Philco Storage Battery Division, Trenton, N. J. (second star).
Shenango-Penn Mold Co., Centrifugal Castings Div., Dover, Ohio.
Lindberg Engineering Co., Chicago (second star).
Ransome Machinery Co., Dunellen, N. J.
Electric Storage Battery Co., Philadelphia.
Twin Disc Clutch Co., Racine, Wis.
Cleveland Worm & Gear Co., Cleveland.

•

Associated Spring Corp., Dunbar Brothers Co., Bristol, Conn.
Barlow & Seelig Mfg. Co., American Ironing Machine Co., Algonquin, Ill.
Bath Mills, Inc., Bath, S. C.
Bell Sound Systems, Inc., Columbus, Ohio
Charles H. Besly Co., Beloit, Wis.
Blackhawk Mfg. Co., West Allis, Wis.
Buck X-Ograph Co., St. Louis.
B. F. Goodrich Co., Oaks Div.
Hewitt Rubber Corp., Buffalo Plant.
International Minerals & Chemical Corp., Magnesium Div., Austin, Tex.
Ken Tool Mfg. Co., Akron, Ohio.
Milwaukee Flush Valve Co., Milwaukee.
Springs Cotton Mills, Lancaster Plant, S. C.
Tarrant Mfg. Co., Saratoga Springs, N. Y.
Turner Brass Works, Sycamore, Ill.

TWO PROPELLERS INSTEAD OF ONE...

FROM THE SAME AMOUNT OF STEEL!

Here's a heartening story of wartime achievement — taper-rolled steel plates for propellers.

Manufacturers used to taper these plates for propeller blades by costly machining. It was tedious work, wasted half of each plate and thousands of precious man-hours. ARMCO engineers knew there'd be a big saving if the plates could be tapered *at the mill*. So they designed ingenious rolling equipment that tapers the plates in a few swift passes through the rolls.

But that was only half the job. It took experienced mill men, with years of "know-how," to roll plate after plate to the highest aircraft standards. These alloy steel plates make stronger, tougher propellers for the deadly warplanes that are winning our battles in the skies.

This is only one example of ARMCO Research in action. Many special-purpose metals created by ARMCO are used in all kinds of war-winning equipment. These same steels can help you win sales for your new products when peace comes. Write to The American Rolling Mill Company, 2961 Curtis St., Middletown, Ohio.

SPECIAL PURPOSE ★ ARMCO ★ SHEET METALS

The American Rolling Mill Company

Fatigue Cracks . . .

BY A. H. DIX

Jim Crowless WPB

. . . Your item about the advertiser who avoided the phrase "niggardly buying power" because of the race prejudice angle made us think of our recent CMP 4-B application for steel to be used in making a "nigger bar," which is used for turning the logs on the carriage in sawmills.

The authorization was granted all right, but the WPB changed it to "saw mill colored bar."

—*Don Buzzard,*
Buzzard Iron Works, Bellingham, Wash.

Stopper

• • • There'll be elbow bending at the front in 15 minutes!—*The DeVilbiss Co.*

It Happened in 711

• • • Your favorite family journal will receive in 1943 roughly 100,000 pieces of mail. Even though the year has still six weeks to go, our money for the prize-winning letter is on this one that just came in from Edwin Weed Small, of 418 W. 10th St., Kansas City 6, Mo.:

Seeing a copy of your valuable periodical recently recalled to memory a late departed brother in bonds of Sigma Alpha Epsilon, University of Pennsylvania, 1904-07, who, as I recall became affiliated with your organization . . .

Also, the name of your valuable periodical, by the law of mental attraction, suggests "The Iron Testament," translated from the Greek by my good friend S. Gargilis . . .

Friend S. Gargilis believes as I do, that in due season I shall become President of the United States of America —a JOB I never sought and am not now seeking, and shall never seek! What I did seek and found many years ago was the Kingdom of Heaven within me. And while an indweller there, early Sabbath morning at Eastertide in the Year of Grace 1926, in Room number seven-eleven of the Young Men's Christian Association building in "The (old) Athens of the South" (Nashville, Tenn.) I had a VISION wherein "the Covenant-making and Promise-Keeping God" offered me unconditionally the Presidency of these United States of America, and wherein I accepted . . .

And so when the spirit prompts me, I write letters to divers and sundry folks telling them about this WONDERFUL and MARVELOUS VISION I had early Sabbath morning at Eastertide in the Year of Grace 1926 in Room No. 711 of the "Y" at Nashville, Tenn.

Anything can happen in a room numbered 711.

Aptronym

• • • The John Finn Metal Works, Seattle, Wash., writes that the secretary of the Coal Producers Assn. of Washington is James E. Ash.

Time Is Out of Joint

A Kentucky ironmaster named William Kelly discovered the blast furnace by accident when he let a blast of air pass through his molten iron . . .

—*Time, Nov. 8, p. 92*

Like Kelly did. Kelly was a product of the 19th century, while the blast furnace dates back to prehistoric times. Through a hiccough on Fate's ticket-numbering machine, Kelly and Sir Henry Bessemer drew stubs to the same seat in the Hall of Fame. Both developed a process of refining iron by blowing air through it. Bessemer won the toss, and the instrument is known as the bessemer converter—small "b."

We will not disturb international relations at this critical moment by reciting Kelly's claims, but this is something Col. McCormick might kick around after wringing the Rhodes scholars dry.

Blurb

• • • We sternly repress most of our impulses to parade your favorite family journal's virtues before you. The reason is more a fear of your yawns than an overdose of modesty. But the following example of cause and effect exceeds the limits of our pressure valve, so here goes:

1. The Aircraft Council for War Production made up for its members an analysis of the technical articles worth reading, as published in a recent 12-month period.
2. An electrical equipment manufacturer sent his industrial customers a "what-publication-do-you-prefer" questionnaire.

In each instance your favorite family was, of course, in the Abou ben Adhem position.

Naval Note

• • • Roy S. (Sealed Power Corp.) Harvey sends us the WPB Detroit Region's "War Production Bulletin," which lists equipment for sale. Equipment is equipment to the WPB. Nestling in among compressors, boilers, spot welders, hoists and steam traps are 10 permanent wave machines. Mr. Harvey thinks this item ought to be captioned "Naval Note," and so do we.

11:55 and Nothing on Paper

• • • We have been peeking over the shoulders of corporate scholars to see how far they are progressing with their assigned topic, "What We Will Do When War Business Ends." Most, we find, haven't written a line. They are still chewing on their pens, waiting for an inspiration.

The assignment is admittedly a tough one—something like being an architect and getting an order to design a house for someone who won't tell you how many are in the family, how much he can afford, where his lot is located, and all the while concealing an aversion to the Cape Cod type that is practically psychopathic.

But all is not fog. How your product stacks up with competition is a tangible, and you probably have at least a misty conception of the size of your postwar market. If, to use an advertising agency sweetheart, the potential looks big, you will obviously concentrate on product improvement.

But if your postwar market looks puny, you are doubtless looking around for other things to make. In your "Candidates for New Products" folder should certainly be the lists of alien patents for metal products and processes, as given you by your ever-helpful favorite family journal.

The demand for the first list, published in our July 8 issue, was so heavy that we had to reprint it. If you missed it, send 15c. to us at 100 E. 42nd St., N. Y. 17, and be sure to clip the later lists. The second begins on page 95 of the Nov. 4 issue and the third on page 97 of last week's issue. More to come.

If any product catches your eye, you can get the whole patent by sending a dime to the Commissioner of Patents, Washington 25, D. C. . . . and if you want a license to make it, you can get it for $15 by applying to the Office of Alien Property Custodian, Washington 25.

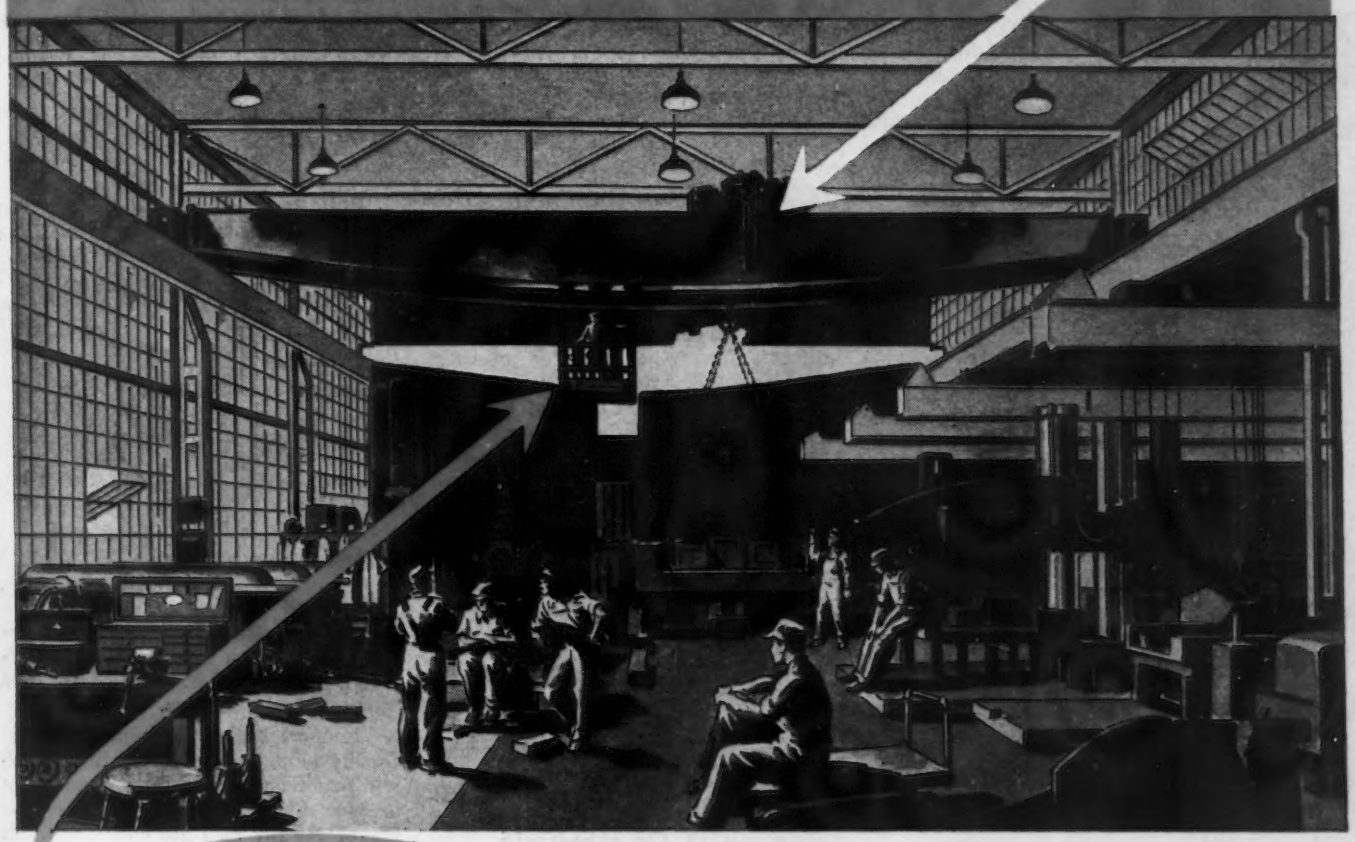
Puzzles

Last week's couples team up thus: Percy and Mame, Joe and Monica, Reginald and Genevieve.

This featherweight will hardly register on your cerebral ammeter, but it must be solved within three minutes to earn you a credit:

A father pays his son 8c. for every problem correctly solved and fines him 5c. for each incorrect solution. At the end of 26 problems neither owes the other anything. How many problems did the boy solve correctly?

WAITING FOR THIS CRANE LOSES LOTS OF MAN HOURS



AN EXTRA Northern CRANE Would Save Them

Maybe they wait only a few minutes—but if they do it many times a day, plenty of man hours are lost—and you pay for them.

Moreover, the whole production schedule is slowed—time is lost everywhere—costing money and impeding your part of the war effort.

An extra Northern Crane on the runway will save all these countless minutes now being lost. Also, if you have an extra crane you need not fear breakdown—it won't tie up your shop.

Investigate the time saving possibilities of an extra crane.

Northern Cranes are fast, powerful, strong, have fine control. They are the fine machine tools of material handling.

Northern

ENGINEERING WORKS

General Office: 2607 Atwater St., DETROIT 7, MICH.

NORTHERN CRANE & HOIST WORKS Limited . . WINDSOR, CANADA

OFFICES IN PRINCIPAL CITIES

Dear Editor:

FOR WORLD WAR III IDEA FILE

Sir:

Head lamps on automobiles operating on the coasts should have been blacked out on the lower half of the glass, and not the upper half. The lower surface of the reflector bounces the rays upward, where we did not want them, and the upper part of the reflector bounces them downward, where we desired them. Painting the upper half of the glass was not correct.

It is too late to do anything about it now, but nevertheless I speak—just to avoid the same error in the next war.

A. O. SCHAEFER,
Supt.

Atlantic Service Co.,
711 Caton Avenue,
Brooklyn, N. Y.

ENGLISH PROFITS CONTROL

Sir:

Your Sept. 16 "News Front" stated, "The English system of profits control is particularly drastic. Allowed is 7½ per cent on the company's own working capital (ruling out bonds held, etc.) plus a performance lagniappe up to 2 per cent of annual capital turnover. Performance profit on government capital turnover is ⅛ that rate."

The above is not clear to me. Are you using the term "working capital" in the sense of quick assets? Apparently not. Does the phrase "two per cent of annual capital turnover" mean two per cent of annual sales? Is the first 7½ per cent taxes?

G. S. C.

● "Working capital" is not used in the same sense as "quick assets," as it does not include any assets not actually employed in production. "Two per cent of annual capital turnover" means 2 per cent of annual sales. The expression is used to distinguish government-capital production from the firm's own capital production. Performance bonus on annual sales produced by government capital is up to ⅛ of 2 per cent. No matter how large annual sales are, the total profit can never be higher than 15 per cent of the company's own working capital.

The first 7½ per cent (and the additional turnover bonus, if any) is subject to the excess profits tax, which is charged at a rate of 100 per cent with the years 1935-1937 as a base. Twenty per cent of the amount paid as excess profits tax is credited to the firm for post-war repayment, when it will be subject to the income tax then current. At the present rate, the net return to the firm would be 10 per cent.

After the excess profits tax has been paid, the remainder of the profits has to meet an income tax of 50 per cent. Even apart from this tax, gross profits have fallen each year since 1938-39. The stockholder receives the remaining 50 per cent as dividends "income tax free." He has, however, still to meet a steeply graduated surtax on all income over $8000 a year. To have a net income of $25,000, a Briton would have to have a gross income before taxation of $350,000. In 1942, only 80 persons had an income, after taxation, of over $24,000, as compared with 7,000 in 1938.

The British prefer a complete costing clause in their war contracts, rather than later renegotiation, and almost all their war contracts are now on this basis. Hence, costing is by item, rather than on the firm's entire output. In practice this means, at first a provisional item price with a rebate quantified by preference to the return on employed capital, and, after further experience in producing and costing the item, a set price.—Ed.

DAMNED DECIMAL POINT

Sir:

I would draw your attention, with due reticence, to pages 55 and 56 (Oct. 21 issue) of your very interesting and accurate magazine, which epitomizes a paper on iron plating, by William B. Stoddard, Jr., as read before the Electro Chemical Society.

On page 55 we find that manganese chloride of 65 oz. per gal. is required, and on page 56 apparently you have changed your mind and only required 0.65 oz. per gal. I know by experience that your magazine never makes a mistake, but how about giving your proofreader a holiday?

P. A. E. ARMSTRONG

Coleytown Road,
Westport, Conn.

● The decimal point is needed, as the editor who abstracted Mr. Stoddard's paper, and not the proofreader, should have known.—Ed.

REDUCIBILITY OF ELEMENTS

Sir:

Can you tell me where I can obtain the complete text of a talk on "Reducibility of Alloying Elements," as abstracted on pages 52 and 53 of your Oct. 21 issue.

E. G. WERTHEIMER,
Asst. to Pres.

General Screw Mfg. Co.,
1224-44 W. Monroe Street,
Chicago

● Write to the Electro Chemical Society, Columbia University, Broadway and 119th St., New York.—Ed.

SEAPORCEL

Sir:

Who makes "Seaporcel," mentioned in the Oct. 21 "News Front," a fireproof ceramic coating that does not char, chip or crack, and used by the Navy for covering bulkheads, doors, etc.?

J. E. NEIGHBOR, JR.,
Purchasing Agent

Roll-Away Window Screen Co.,
8th & Carlton Streets,
Berkeley, Cal.

● Write to J. A. Stewart, 209 Fourth Ave., Pittsburgh.—Ed.

NITRIDING

Sir:

Will you send us a copy of "Present and Future Nitriding," by V. O. Homerberg, which appeared in THE IRON AGE of Jan. 2, 1930, issue?

ANNE V. McLAREN,
Engineering Librarian

Curtiss-Wright Corp.,
Propeller Div.,
Caldwell, N. J.

● The issue is not in stock and no clippings are available. But a copy has been obtained from H. W. Wilson & Co., 960 University Ave., New York, dealer in back number magazines.—Ed.

CUTTING TOOL BOOKLET

Sir:

Will you please send me your latest booklet on "How to Get Maximum Output from Your Cutting Tools"?

C. M. BINER,
Genl. Supt.

Jacobs Aircraft Engine Co.,
Plant No. 2,
Pottstown, Pa.

● Mailed; price 60c.—Ed.

CENTRIFUGAL CASTINGS

Sir:

Recently, while in New York, I telephoned Mr. Phair, your associate editor, and discovered he was not in. I regretted this, as I wished to see him to discuss a note which was published in your Oct. 7 issue entitled "Centrifugal Castings."

This note leaves the impression that the development of centrifugal casting practice using green sand molds is new and is in the experimental stage. As far as I am concerned, this is not new and is a very practical practice. From an economy standpoint we believe that dry sand molding omitting the use of a flask is more economical. It is the practice of a few foundries doing centrifugal casting to do their experimental work using green sand molds, because in this way they do not require split patterns and can very easily cut by hand the gates required.

We also recommend as standard practice that all centrifugal castings which require molds larger in diameter than 40-in. be produced in flasks using green sand molding practice skin dried.

I wish to compliment your magazine on the excellent articles and news items which are published and which are always up to date and of interest, except for the very occasional exceptions pertaining to centrifugal casting with which I am familiar.

NATHAN JANCO

Centrifugal Casting Machine Co.,
P.O. Box 947,
Tulsa, Okla.

● Mr. Phair, our associate editor, joined the Seabees. We miss him greatly.—Ed.

"JUST LIKE WE USED BACK HOME!"

Yes, those Monarch lathes which many of our fighting men found so dependable back home, are now equally hard at work, all over the world. In supply and repair depots and bases, they are busy day and night, helping to keep our fighting equipment in good order.

Even such rough handling as pictured here cannot stop the precision performance of these ruggedly built, rigid tools. They stand up and take it, whether on advanced bases abroad or in war plants at home.

These Monarch lathes have a long record for fast, accurate production of the widest variety of work. To produce more pieces, at less cost and effort, make Monarch your lathe choice.

THE MONARCH MACHINE TOOL COMPANY
SIDNEY, OHIO

MONARCH LATHES
Save Time

This Industrial Week . . .

- ***Easier Trend in Certain Steel Products Emphasized***
- ***100,000 Tons of Aircraft Allotments Unused***
- ***WPB Facing Problem of Quickly Adjusting Distribution***
- ***Numerous Price Developments Headed by Iron Ore Change***
- ***National Ingot Production Rate Rises Half a Point***

THE past week has brought out new trends confirming the more comfortable relationship between steel production and consumption. A number of price developments have provided another trend of interest in steel.

Large accumulations of excess ingots, the considerably easier situation in electric furnace alloy steel, the severe cutbacks in certain phases of the war equipment program (with additional reductions scheduled to come)—these are among current conditions facing WPB. Doubtless adjustments will be made, for obviously any slack could be taken up speedily if WPB assigned the steel to civilian channels and if manufacturing facilities and manpower were adequate to handle the material for public needs.

Greater consciousness in regard to inventories has contributed heavily to the improved material supply situation, evidenced by the fact that more than 100,000 tons of steel allotments for the fourth quarter have been returned as unused to the Aircraft Scheduling Unit at Wright Field by the aircraft industry. These returns are roughly 20 per cent of the gross amounts handed out to the industry.

Large new cancellations affecting certain types of ammunition are reported this week, on the heels of earlier cutbacks. Schedules of cold finished bar mills will be altered particularly. All United States Government contracts for gilding clad metal with a steel base have been disposed of and the small bullet jackets will be made of copper. At one time over 15 steel companies were using the gilding clad process.

REPORTS have been heard this week concerning a possible cut in the program for steel drums and helmets. Carbon steel ingots are being offered to Chicago district buyers from at least four different areas, where mills temporarily are surfeited. Lend-Lease requirements from one foreign nation for the first quarter are understood to be about 500,000 tons lower than heretofore.

News Highlights in This Issue

Post-War Reserves	78	Latin American Steel	102
300 Months' Steel Trends Studied	91	More Enemy Patents	104
Steel Trends Chart	92	Labor Front	106
OPA Upping Prices	94	Post-War China	108
Air-Cargo Problem	96	Mine Wages Condemned	114
Unused Aircraft Quotas	97	Ingot Output	114
D-E Shipbuilding	100	Steel Shipments	116
		Priorities News	118

Flat rolled steel is still tight with space on first-quarter rolling schedules still being sought by consumers. This is a notable exception to the situation in certain other divisions, which is forcing authorities at Washington to move quickly toward adjusting distribution.

Stated requirements of the various Claimant Agencies do not reflect much easing of steel demand but the 21,000,000 tons requested in first quarter, about 4,000,000 tons over supply, includes inflated needs.

It is interesting to note that in Canada, where trends all through the war have preceded those of the U. S. by several months, curtailed war production is changing the makeup of steel producers' books. Backlogs are heavier with orders from makers of civilian goods.

In the U. S., household appliance manufacturers are reported being queried on the feasibility for partial reconversion to these products for second quarter production. One appliance producer will start a limited program Jan. 1.

AMONG price developments this week, the principal news is that OPA will "unfreeze" the Lake Superior iron ore price schedule so that ore producers whose prices were frozen at the 1941 season levels can come up to the $4.45 base ceiling, resulting in a net increase of about 10c. per ton for the entire 1943 season and thereafter. The revision is not all that the ore industry desired. Higher ore prices naturally will be reflected in other departments of the iron and steel industry.

The ore price development long had been expected. It comes on the heels of higher costs resulting from the wage increase won by John L. Lewis, which also set off demands for higher wages from steel workers. At the same time, the organization of white collar workers in the steel industry, mentioned here two weeks ago, shows signs of accelerating.

Other price adjustments include an 80c. per ton increase on foundry and furnace by-product coke for producers in the Mid-West and South; a $5 per ton boost on rails granted Colorado Fuel & Iron Co.; an increase of $7.25 per ton on rerolling carbon billets granted one plant of Carnegie-Illinois Steel Corp.; a $1 per ton boost on pig iron granted E. & G. Brooke Iron Co.; a boost on rerolling billets given Connor Steel Co. and other increases including a boost for five wrought iron producers.

The steel union's drive for higher wages starting in December is generally expected to win a modest boost eventually, in view of the government's action in the coal mine question, and to be handled on an industry-wide basis. Previously, wage nego-

tiations have been highlighted by the so-called "Big Steel" and "Little Steel" factors.

Additional blast furnaces in the South resumed operations this week as coal became a little more plentiful. The return of the miners has not been 100 per cent accomplished to date, and last week most mines in western Pennsylvania at least were forced to shut down on Armistice Day because the government refused to pay time and one-half on the holiday.

CONFIRMING remarks which have been expressed by auto industry executives recently, A. T. Colwell, vice-president of Thompson Products, Inc., last week told an S.A.E. meeting at Cleveland that steel will be retained by the auto industry for car bodies in the post-war period. He indicated that the physical properties, safety and price of steel would be the important factors in its retention.

Also bearing on the post-war picture of the steel industry is a study of operating rates of the industry over the past 300 months by THE IRON AGE. The rates were divided into normal, depression and war periods. Significant is the indication that in the 139 normal steel months (those months in which the business activity index was over 100) the average steel output in per cent of capacity operations was 74.8 per cent. During the 111 depression steel months, the average steel output was 40.3 per cent of rated capacity. During the war period operations ranged between 90 and over 100, except at the start of the war. It is practical to assume that in the future steel activity will follow somewhat the same pattern, which eliminates any probability that during peacetimes the industry can operate for an extended period above 90 per cent of rated capacity. During the normal period, activity ranged from 65 to 85 per cent about two-thirds of the time.

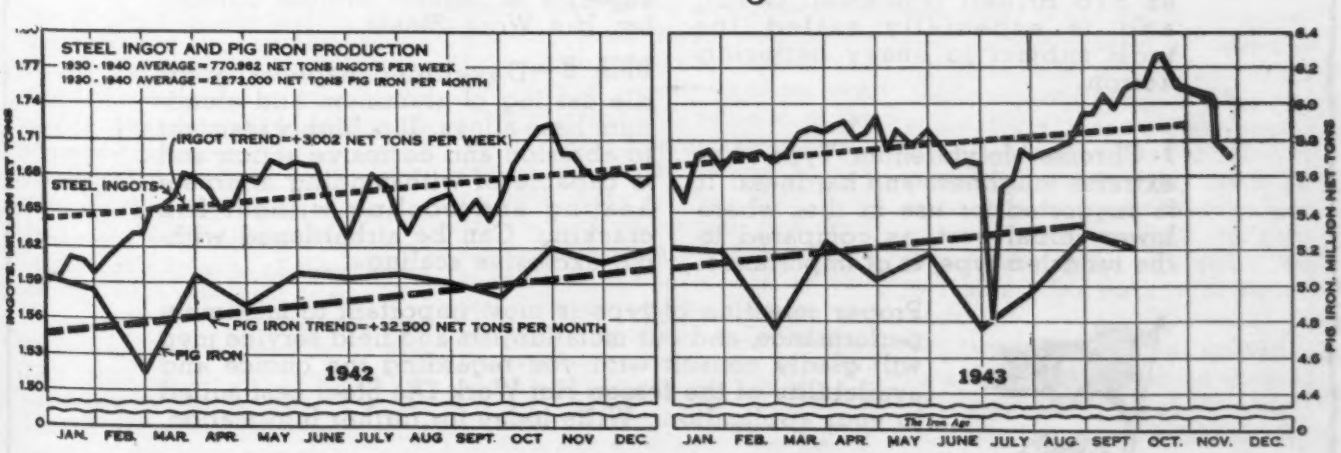
At Washington, the tentative program to have WPB play the key role in unwinding war production when peace comes seems to have been strengthened. Influential Congressional groups believe that in order to prevent a mad scramble WPB should continue to pass out materials after the war ends. Those who foresee a struggle for authority over industrial demobilization between WPB chairman Nelson and Bernard M. Baruch are doomed to disappointment, a high administration official said Tuesday.

THIS week steel ingot production rose half a point to 98.5 per cent of capacity. Contributing to this rise were the gains at Pittsburgh, up five and a half points to 103.5 per cent; Philadelphia, up half a point to 94 per cent; Wheeling, up three points to 101; Birmingham, up to 102; Detroit, up half a point to 102.5; Cincinnati, up three to 103; St. Louis, up five to 112 and the Eastern district, up four and a half to 96 per cent. Youngstown has declined three points to 94 per cent while in Cleveland output dropped 11 points to 87 per cent. Because of the strike at Republic shutting down its entire open hearth department, production at Buffalo fell off 22½ points to 82 per cent. Chicago continues at 102 per cent.

The labor front has not been quiet. The strike at Republic Steel Corp. in Buffalo caused the loss of much steel. At the start of this week American Steel and Wire Co. in New England was hit by a walkout. Meanwhile, numerous strikes affected war production in Michigan. An unauthorized strike of 90 slab yard workers at Carnegie-Illinois Steel Corp.'s Irvin Works, early this week, resulted in a production loss of 9800 tons of steel plates, a shutdown of seven open hearths at the Duquesne Works, a lay-off of more than 250 men on the hot mill and open hearths, and a congestion in storing facilities.

Since WPB has announced its intention of decentralization and to allot controlled materials to small manufacturers on an annual instead of a quarterly basis. It is pointed out that a manufacturer must be given an allotment for all four quarters. Any industry division has the right to appeal for permission to use lower cut-off quantities for any specified product. The division is also expected to make any adjustments necessary to correlate the allotments with the production quotas permitted under any L order.

The Iron Age


STEEL INGOT AND PIG IRON PRODUCTION
1930-1940 AVERAGE = 770,962 NET TONS INGOTS PER WEEK
1930-1940 AVERAGE = 2,273,000 NET TONS PIG IRON PER MONTH
INGOT TREND = +3002 NET TONS PER WEEK
STEEL INGOTS
PIG IRON TREND = +32,500 NET TONS PER MONTH
PIG IRON
1942
1943
INGOTS, MILLION NET TONS
PIG IRON, MILLION NET TONS
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philade'p'ia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
November 11...	98.0	102.0	97.0	93.5	98.0	104.5	98.0	87.5*	102.0*	95.0	100.0	107.0	91.5	98.0
November 18...	103.5	102.0	94.0	94.0	87.0	82.0	101.0	102.0	102.5	95.0	103.0	112.0	96.0	98.5

* Revised

FOR FAST ACCURATE PRODUCTION IN SHAPING AND FORMING HOT METALS

USE

JESSOP HOT WORK STEELS

THE rapidly expanding field of forming and shaping hot metals requires various types of die steels because of the diversified characteristics necessary to meet the increased demands for efficient production.

2B-(LC) Tungsten Type with low carbon content in which the analysis is specially balanced to meet the requirement for hardness and considerable toughness. It can be machined with a hardness as high as 375 Brinell (Rockwell C-41), and is especially suited for tools subject to heavy battering action.

J-Chrome-Molybdenum Type—has extreme toughness and hardness. It is suggested for use in dies where lower initial cost, as compared to the tungsten type, is of importance.

JJ—is the same as Type J except for a higher carbon content. It is recommended for use where wearing qualities are most important and where slight sacrifice in toughness is permissible. Performance is superior to regular straight chromium Hot Work Steels.

DICA B—Developed especially for die casting of aluminum and aluminum base alloys. It is highly resistant to abrasion and corrosive action and is capable of withstanding alternate heating and cooling without fire cracking. Can be airhardened without excessive scaling.

Proper selection of type is most important to maximum performance, and our metallurgists and field service men will gladly consult with you regarding the choice and availability of the Jessop Hot Work Die Steel best suited to your application. Write today for further information.

ARMY E NAVY

JESSOP STEEL CO. FINE JESSOP STEELS WASHINGTON PA.

Established 1901

JESSOP STEEL COMPANY

HEAD OFFICE AND WORKS

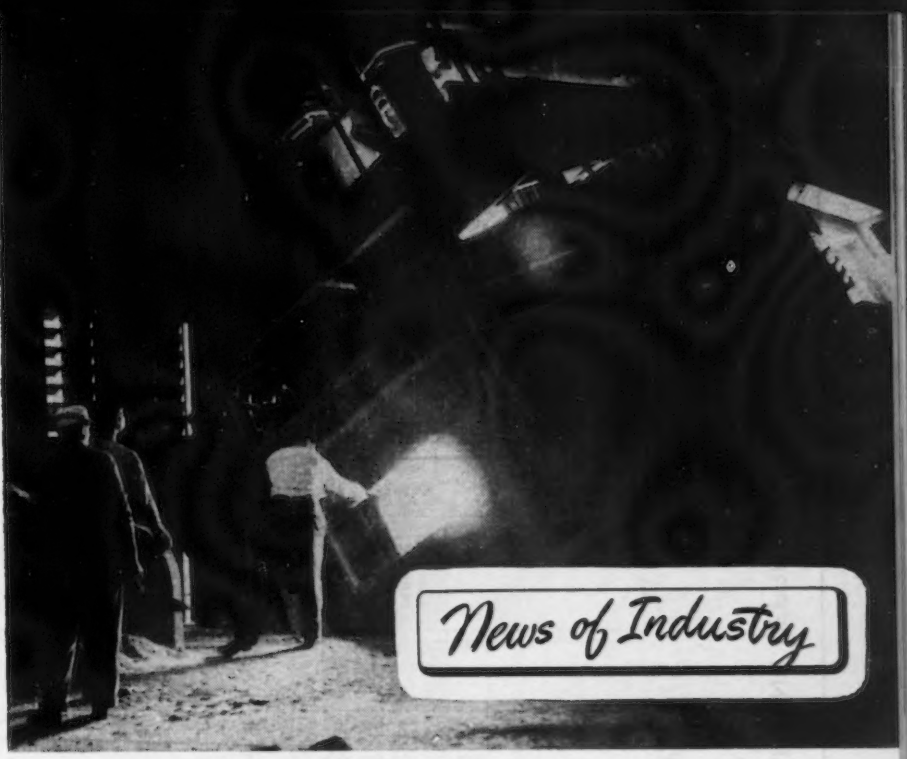
WASHINGTON . . . . PENNA.

Thought Provoking Trends for Post-War Era Found in Study of Steel Rates for Past 300 Months

o o o

By TOM CAMPBELL
Pittsburgh Regional Editor

o o o



Making bottom in electric furnace at Carnegie-Illinois Duquesne Works . . .

Pittsburgh

• • • Those optimistic persons, who, looking at high steel operating rates during the war, expect this tempo to continue in the peace era, are doomed to disappointment. An analysis of steel operating rates over the past 300 months indicates clearly that capacity operations are possible only for an extended period of time during a war era.

While steel operating rates ranged from 95 per cent of capacity to over 100 per cent of capacity, in 40 months out of the past 300 months 35 of these high operating months occurred during the present world war. In only five months out of the past 300 months was the steel industry able to operate in excess of 95 per cent of capacity.

Having a strong bearing on future steel costs, which have been increased substantially because of the climb in average wage rates paid, is an analysis of normal, depression, and war periods in the steel industry by THE IRON AGE. In the 139 months, classified as a normal period, steel operations averaged 74.8 per cent of rated capacity. Contrasted to this was an average of 40.3 per cent of rated capacity during 111 so-called depression months. There have been few times in the steel industry's history when steel operations have been maintained in excess of 90 per cent of rated capacity for any length of time.

The large chart shown elsewhere in this story, which portrays the three periods since 1919—normal, war and depression—for the most part reflects continuity of time. In a few cases, however, some months in a given year were classified as normal months, while other periods in that year were placed with the depression graph, since a check with a business activity study indicated those months to be subnormal.

It is interesting to note that during the normal period steel operations ranged from 85 per cent to over 100 per cent, about 20 per cent of the time. Activity ranging from 65 per cent of rated capacity to 85 per cent occurred about 62½ per cent of the period. Operations were 50 to 65 per cent of capacity in slightly over 17 per cent of the months. Since there are more normal months than there are depression and war periods, over a long span, the analysis of the normal cycle discloses the heaviest percentage of operations to be between 65 and 85 per cent of rated capacity, which is a far cry from continuous full capacity output.

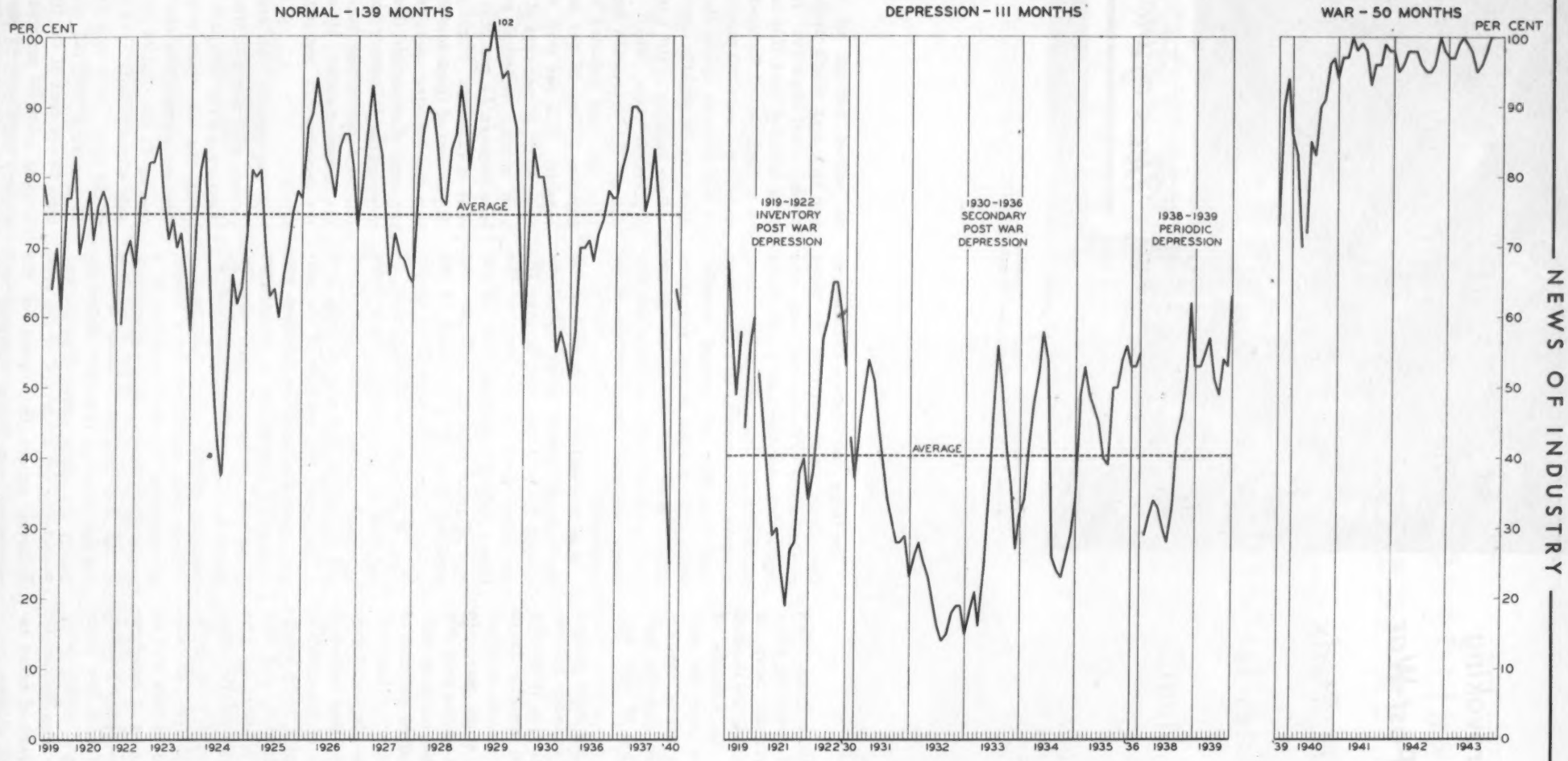
Since war conditions have caused an expansion in steel capacity, at a much faster rate than in peace times, it will be that much more difficult for the industry to reflect higher capacity operation figures after the war. Practically all observers in the steel industry expect that some of the equipment now being operated will be retired because of obsolescence and high cost, which would reduce the overall steel capacity. Nevertheless, it is believed that this capacity will be so high that if the operation's pattern in the next 300 months is similar to the previous cycles the actual figures may be slightly lower.

Poor reading is the analysis of the depression cycle, which shows that out of 111 depression months, since 1919, the steel industry has operated between 30 and 55 per cent of rated capacity, 57.7 per cent of the time. Only about 11 per cent of the depression months reflected an operating rate between 55 per cent and 70 per cent of capacity. Slightly more than 31 per cent of these depression months saw the industry operating below 30 per cent of capacity. The charts accompanying this story have not been put on a percentage basis, but show the actual number of months that the industry has operated at various levels.

If the normal, war, and depression periods are taken as a whole, the steel industry during the past 300 months (with the last three months of this year estimated) has operated in excess of 75 per cent of rated capacity only slightly more than 40 per cent of the time. Activity between 50 and 75 per cent occurred slightly more than 33 per cent of the time. Output dropped below 50 per cent of capacity slightly more than 26 per cent of the

TREND IN STEEL OPERATIONS IN PER CENT OF CAPACITY DURING NORMAL, WAR AND DEPRESSION PERIODS

300 MONTHS 1919 - 1943



SOURCE MATERIAL AMERICAN IRON & STEEL INSTITUTE COMPILATIONS - THE IRON AGE

THE IRON AGE

IN THE ABOVE CHART, normal, depression, and war months in the steel industry through the 300-month period from 1919 to 1943 have been separated into single, normal, war, and depression periods. Significant is the indication that in the 139 normal steel months (by normal is meant those months in which the business activity was above 100) the average steel output in per cent of capacity operations was 74.8 per cent. During the 111 depression steel months, the average steel output was 40.3 per cent of rated capacity. During the war period, it can be seen that operations, except in the beginning, ranged between 90 and over 100 per cent of rated capacity. It is practical to assume that in the future steel activity will follow somewhat the same pattern, which eliminates any probability that during peacetime the industry can operate for an extended period of time at above 90 per cent of rated capacity.

time. The significant part of these figures is that they really look better than they are, because they include 50 war months.

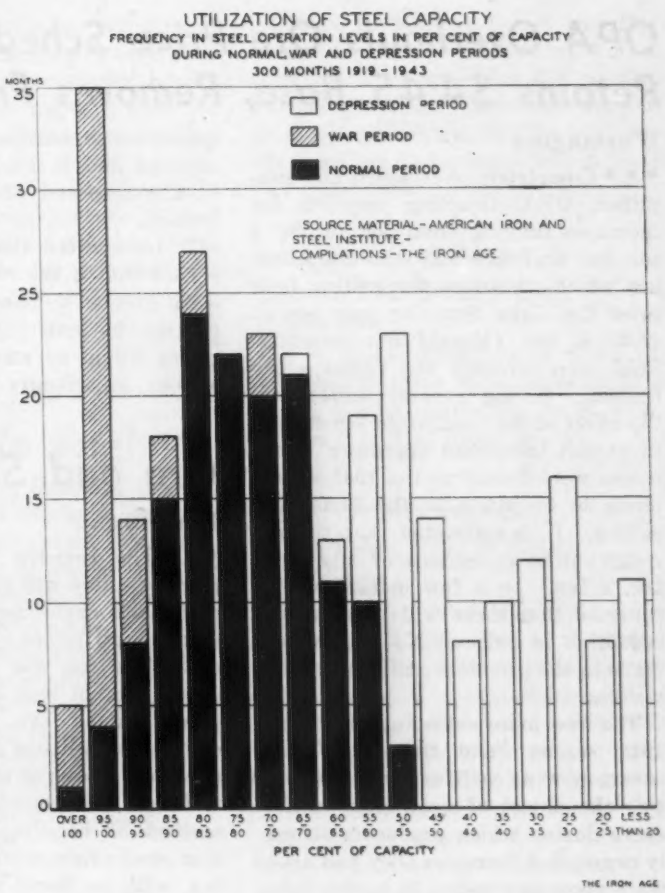
A breakdown in the frequency of steel operations, showing the contribution of war, normal, and depression months, is portrayed in another chart accompanying this analysis. It seems clear that in order to utilize for any length of time the new capacity which has been added to the steel industry in recent years, we must "enjoy" a first class mechanistic war. With steel costs having risen substantially, and with the "break-even" point having gone higher than the 60 to 65 per cent figure estimated for pre-war times, there seems to be little comfort in the figures which indicate the probability of steel operations during the next so-called normal period. Even more thought provoking are the frequency figures, indicating a possible pattern during the next depression period. It would seem that if raw material and wage costs per unit are to remain anywhere near where they are now, the cost of steel after the war will have to be increased if operations follow trends indicated in this study.

Another factor which may have reached the "law of diminishing returns," for a while at least, is the search for new and greater short cuts in reducing steel making costs. Under the heavy pressure to produce war steel, this "out" may have been fairly well exhausted, although future events may force the steel industry to consider what has been done in the past few years as mere child's play.

Higher prices for steel would seem to be the easiest way out, and in the long run would probably not be economic in view of the danger of competition with other materials. Probably most post-war steel plans have, as their basis, a search for a solution to expected conditions which are disclosed in these charts.

There is no way of knowing what the "break-even" point in steel operations will be after the war. Before the intensive unionization of the steel industry brought higher wage rates, the average "break even" point was said to be somewhere around 45 per cent of rated capacity. However, by 1938 and 1939 this had climbed probably to around 65 per cent of rated capacity. The steel industry presents a paradox in that once having reached the "break even" point, the percentage of profits increases at a much faster rate than the increase in steel operations. During the present war period, however, this factor was neutralized by a substantial jump in taxes.

It would seem safe to assume that the "break-even" point after the war certainly will be no lower than 65 per cent of capacity, and probably will be closer to 75 per cent if wage rates again are increased and taxes continue, as they probably will, well into the next peace period. Having continually been an industry which has had to lay out gigantic sums for productive capacity, the steel industry, probably faces more difficulties in the future than any other single industrial group, It faces not only increased competition from other material, but high wages, high raw material costs, and a "prince and pauper" existence, as exemplified by sudden declines in output during depressions.



(by normal is meant those months in which the business activity was above 100) the average steel output in per cent of capacity operations was 74.8 per cent. During the 111 depression steel

ability that during peacetime the industry can operate for an extended period of time at above 90 per cent of rated capacity.

Civilian Goods Orders Rise in Canada

Toronto

• • • **Curtailment** in a number of branches of the Canadian war production program, which has been gradually overtaking industry for the past two or three months, is beginning to take a rather heavy toll of business from steel producers in this country. War contract cancellations have resulted in slowing new orders for finished and semi-finished steel, and have been reflected in reduced output of primary steel and rolling mill products. Following the announcement that Dominion Steel & Coal Corp. Ltd., had reduced operations in its plate mill at Sydney, N. S., from two to one shift a day, result of curtailment in shipbuilding operations, it was reported in the past week that the corporation has closed down the rolling mill, bolt and nut plants of its subsidiary works at Trenton, N. S., throwing some 700 men out of work. Ross H. McMaster, president of the Steel Co. of Canada Ltd., Hamilton, stated that operations at the plate mill will be affected by curtailment of the shipbuilding program. "However," he stated, "the contraction of munitions production as it affects the use of steel, it is hoped, will be absorbed largely by a reduction of imports." An Ontario blast furnace was blown out last week, bringing the number of active stacks to 11 out of a total of 14 in Canada.

While steel mills in Ontario are fully booked on production for the remainder of this year and have substantial carryover of backlogs into 1944 on war account, it is stated that a large part of the new orders placed is associated with civilian enterprise. Some peacetime producers that have been out of production for the past four years are again receiving raw materials supplies and gradually swinging back into their normal lines of manufacture. Non-war industries are receiving better deliveries of steel and more consideration.

OPA Overhauls Ore Price Schedule; Retains $4.45 Base, Removes Freezes

Washington

• • • **Completely** overhauled and simplified, OPA, rejecting requests for increases ranging from 30c. to 50c. a ton, has drafted a new iron ore schedule which continues the ceiling base price for Lake Superior iron ore at $4.45 a ton (Mesabi non-bessemer, 51.50 iron content) but removes the freezes. Giving greater uniformity, the effect of the readjusted schedule is to permit individual operators whose prices were frozen at the 1941 season levels to fix prices at the $4.45 base ceiling. It is estimated that the net result will be an increase of only about 10c. a ton. In a few instances it is reported that there will be an actual reduction in prices. No change was made in the premium and penalty provisions.

The new price set up applies to the 1943 season "and thereafter," and covers new as well as old mines. It was the object of protracted conferences during which producers strongly urged that increases they had asked were necessary owing to higher labor and other costs. The OPA determination, however, was a compromise, which, it is claimed, will insure profitable operations. At the same time it is said that OPA in turning down requests for greater increases than were granted had in mind the probability of a widespread effect from such increases.

It is reported that OPA was concerned that if the requested increases were granted demands for general increases in both pig iron and steel prices would be made, pointing to a serious inflationary trend. Whether or not such requests have been forestalled, it is contended that they have at least been lessened. On the other hand, it has been pointed out, this prospect will be entirely eliminated if expected demands for general wage increases are made by the United Steelworkers. President Philip Murray of the CIO has clearly indicated that such demands will be made.

Already, pig iron and steel making costs have been increased as the result of higher wage boosts forced on the government by John L. Lewis.

o o o

Ore and Steel Prices on Same Basis

Pittsburgh

• • • **The revision** in the iron ore price schedule will put iron ore prices under the same method of handling as are steel prices. When the ceiling of $4.45 a ton was set, for non-Bessemer Mesabi iron ore, it applied to newly mined ore, and the prices charged by all ore producing companies were frozen at the 1941 sales quotations. This contrasted to the OPA method of handling steel prices, in that steel prices were placed at a ceiling, with no levels frozen. The new iron ore price revision removes the frozen levels on iron ore sold below the $4.45 a ton ceiling and allows all companies to charge the ceiling price.

The effect of this change will be that some ore companies will obtain a greater increase than others. Those companies which sold at the lowest level in 1941 will obtain the greatest increase, providing their adjustments, involving newly mined ore, have not been substantial. Under the old price schedule, ore producing companies were allowed to weight their sales of ore from older mines and ore from new mining operations in a proportion involving the frozen price level of the old ore and the ceiling of $4.45 a ton for newly mined ore. This had the effect of raising the average price of ore. Under the new order, to be issued this week, and which is said to apply to the 1943 season and thereafter, the average should theoretically be the ceiling price.

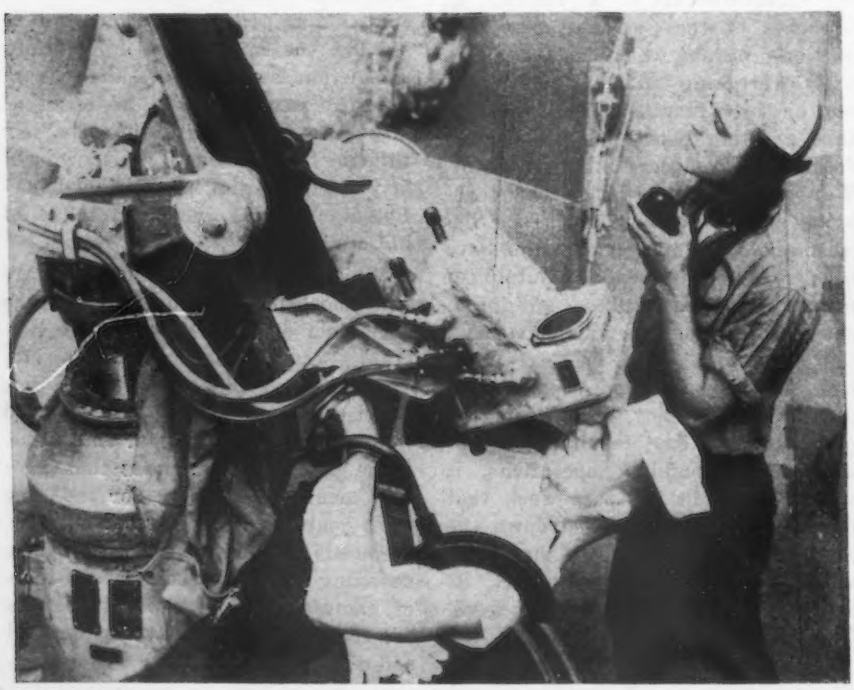
The revision is far from what the ore industry had wished for. At least $4.75 a ton had been sought, and most observers and ore people had been led to believe that a compromise might have been reached at about $4.60 a ton. All that was obtained was the unfreezing of the frozen prices, so that they could advance to the ceiling price for newly mined ore.

Nevertheless, this change will mean increased ore costs to the smaller integrated steel mills, which do not have their own mines. On the other hand, it means slightly more revenue for some of the larger steel companies, which at various times have sold ore in the open market. It compensates to a slight extent the claimed increases in cost for strictly ore producing companies. Obviously, these latter do not believe that the OPA revision will meet the needs of the industry.

Merchant blast furnaces and those integrated steel mills which must purchase their ore, are expected immediately to seek some means of raising pig iron prices. Because the OPA has not looked with favor on raising the

FLEXIBILITY IS NEEDED: Arched backwards into an almost horizontal position, this young Navy gunner peers through his automatic sighting device while operating a light anti-aircraft cannon.

U. S. Navy Photo-International News



pig iron prices for the large integrated steel mills, it is believed that this government agency will have a tough problem in analyzing and approving or disproving higher pig iron prices. While it is conceivable that the overall published pig iron prices may be advanced, the OPA may nevertheless attempt individual or specific corrections. In the last analysis, this would not mean much to those companies which might be allowed to charge higher prices, for the simple reason that pig iron is becoming more abundant, hence consumers would seek to place their orders at the lowest price available. It appears that the pig iron price adjustment problem presents a stickler for the OPA.

With higher coal prices, and with the probability of an increase in steel wage costs, the OPA, unlike the WPB, will probably be busier over the next several months than it has been since it established iron and steel price ceilings.

o o o

Price Increase Granted Colorado Fuel

Washington

• • • **OPA has announced** an increase of $5.00 per gross ton on steel rails produced by the Colorado Fuel & Iron Corp. making its sales price now $45.00 per ton. The corporation had petitioned for an increase to $48.00 per ton.

The OPA letter of transmittal to the corporation said that an examination of the corporation's cost figures indicated that this product was the major contributing factor to the corporation's present financial condition. Current production costs (on rails) were admitted to be above the OPA ceiling set in Schedule 6. The $5.00 increase, OPA said, was estimated sufficient to enable recovery of present costs and base period profit. The increase is retroactive to shipments made after July 31, 1943. The way was also left open by OPA for the corporation to file another petition if this is found necessary at a later date.

o o o

C-I Gets Ingot Price Rise at Pencoyd

Washington

• • • **The Pencoyd Works** of Carnegie-Illinois Steel Corp. has been granted an increase of $7.25 in the price of reselling grade carbon steel ingots by OPA. This sets the price at $38.25 per gross ton f.o.b. mill. The corporation had originally petitioned for an increase to $39.37 based on cost figures which included allowances for selling, general and administrative expenses.

The OPA in reviewing the petition, the announcement said, considered the overall financial position of the Carnegie-Illinois Steel Corp. and its parent firm the United States Steel Corp. Finding the overall profit statement to be satisfactory, OPA granted only enough increase to cover actual manufacturing costs of ingot at the Pencoyd Works, omitting amounts requested for sales expenses and contingencies. Based on this decision, OPA also asked that the Pencoyd Works file a report of actual manufacturing costs for ingots every quarter.

•

• • • **Connor Steel Co.**, Birmingham, has been allowed a price increase to $50.69 per gross ton on rerolling grade carbon steel billets by OPA.

•

• • • **Four wrought iron producers** have been granted an increase of 90c. per 100 lb. and one wrought iron producer has been granted an increase of 80c. per 100 lb. The four producers increased by 90c. are Ewald Iron Co., Louisville, Ky.; Ulster Iron Works, Dover, N. J.; Logan Iron & Steel Co., Burnham, Pa., and the Penn Iron & Steel Co., Creighton, Pa. The producer advanced 80c. is Lockhart Iron & Steel Co., Pittsburgh.

•

Increased Iron Price Granted to Brooke Co.

Washington

• • • **Made** retroactive to Sept. 18, OPA has granted an increase of $1 a ton on pig iron made by the E. & G. Brooke Iron Co., Birdsboro, Pa.

•

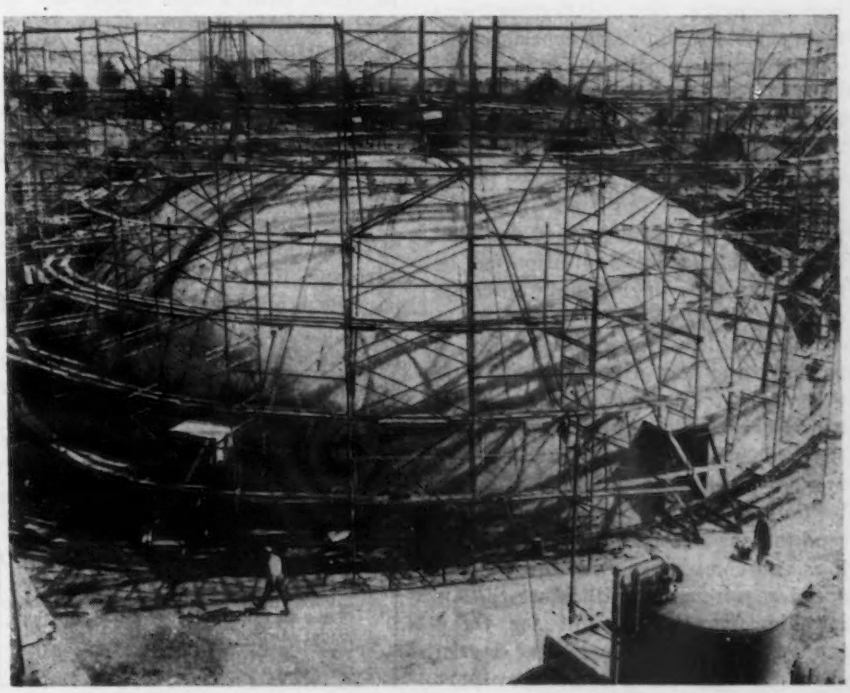
OPA Grants Foundry Coke Price Rise in South

Birmingham

• • • **Pending conclusion** of its study of by-product coke costs of the entire industry, OPA has granted certain producers in Alabama an increase of 50c. per ton in the price of foundry coke only. This price was put into effect Nov. 1 at $9.00 f.o.b. ovens.

• • • **OPA has granted an** 80c. per ton price increase on foundry and furnace by-product coke for producers in the Middle West and South. The increase will become effective on issuance of a new schedule, expected soon. The schedule for the first time will carry dollars and cents prices for blast furnace coke.

THIS CONCRETE "IGLOO" was built by pouring concrete and an insulating material over the outside of an inflated canvas bag form. When the concrete hardened, the bag was deflated and removed, leaving a cheap and sturdy building.



Converted Military Aircraft Held No Threat to Post-War Air Commerce

Chicago

• • • **Conversion of** military transport and combat planes as post-war freight carriers holds no long-time economic threat to mass production of specially designed cargo planes, it was argued on the annual air-cargo program of the Society of Automotive Engineers at Chicago last week.

E. C. Wells, chief engineer, Boeing Aircraft Co., reached this conclusion after analyzing original and operating cost factors inherent in converting military planes to post-war use. He allowed, however, that the converted military airplane must be utilized if additional equipment is to be made available to operators in the immediate period following the war, reaching his conclusion purely on an economic basis and laying aside military and political intangibles involved in disposition of military aircraft and other war materiel.

"Air-cargo rates can be appreciably reduced from their present values by the use of converted military transport equipment, but still further gains are possible for aircraft especially designed for the purpose," he declared.

"The airplane is a specialized piece of equipment and simply increasing operating weights will not produce magic. The fuselage will prove inadequate for greater pay-loads if a large part of the pay-load is used for passengers, though this limitation can be avoided to some degree in an all-cargo carrier.

"The problem of converting military combat and strictly military cargo types of airplanes to commercial use will be considerably greater than the problem of reconverting the former commercial transports (taken over by the military). The military types tend to have relatively high wing loadings and compliance with the stalling speed requirements will affect the allowable operating weight for these types to a considerably greater degree than for the reconverted transport types. The necessity for major redesign of combat types involves a large expense and time delay. Since the converted airplanes can serve the airlines officially for only one or two years, any conversion is of major significance. The 'battle scars' of bombers would necessitate elaborate inspection, repair and replacements before the airplanes would be fit for operation as public carriers. These costs as well as the cost of conversion of the fuselage, replacement of bullet-proof fuel tanks, etc., would have to be borne by the operator. Thus, they should not, under the most optimistic conditions, approach the 'no depreciation' cost shown for the reconverted transport type."

Relative merits of land planes and flying boats for cargo carrying, particularly in global air transport, were heatedly debated both in formal papers and comment from the floor. A high naval transport official stated that for a 3000-mile flight a flying boat could carry 50 per cent greater pay-load than a land plane, but the land plane would arrive five hours faster at a one-third greater cost. In rebuttal, it was stated by an official of an aircraft manufacturing firm that studies now being made promise to increase materially the pay-load of land planes.

As a sidelight in his discussion of "Design Considerations of the Cargo Airplane" Carlos Wood, chief, preliminary design section, Douglas Aircraft Co., Inc., Santa Monica plant, stated that "it should be pointed out that at present the necessary bulkheads and flotation provisions required in flying boats make a continuous cargo compartment difficult of attainment. In case flying boat type cargo airplanes are required, the requirements of the cargo compartment must be given suitable consideration for a successful design. This may entail the use of double bottoms and other flotation provisions in order that a suitable cargo compartment will be available."

He ventured that the eventual cargo plane for domestic use would probably be a high wing type with the floor close to the ground but that transoceanic types would probably continue to be low winged because of superior water landing characteristics.

Agreeing with most of the other speakers that the big probable field for air cargo lies in the transportation of perishable and relatively high valued goods, he also conceded that lower air cargo rates would vastly expand the market.

H. W. Anderson, vice-president, aviation division, Whiting Corp., stated that cargo handling equipment manufacturers were faced with a quandary because of wide variation in aircraft terminal design, types of cargo planes, various means of access to planes, and the wide variation in the types of cargo handled. He acknowledged that there was little harmony of opinion on what constitutes a proper loading method and that nothing in the field had proved universally acceptable.

Satisfactory units have been developed for transporting cargo across the field and raising the load to door level, and some even pass the cargo through the plane door, it was stated, but these leave the remaining steps of turning, traveling, lateral movement, and final positioning and fastening the cargo within the plane to be carried out. In general, large airport transport units are said to be preferable to small ones. Within the plane, advantages were attributed to a bridge crane type conveyor with hoist over the single rail hoist supported from the ceiling. Where it is necessary to carry loading equipment on the air journey, a roller conveyor of magnesium alloy was mentioned as adaptable.

Looking into the future, Mr. Anderson conjectured that specially designed cargo carrying planes and cargo handling airports at which the airplane could be conveniently transported to the terminal building to take advantage of fixed handling devices would eliminate preliminary loading problems. Departure from the traditional side loading design to load through top or bottom hatches or through tail or nose would greatly expedite actual loading and stowing, he predicted.

SKY FREIGHT: The Heil Sky Freight Loader (above) is shown lifting freight to the proper level for easy loading into a present day cargo plane. A streamlined version of the loader awaits peacetimes for production. Made by the Heil Co., Milwaukee.

Waldo Waterman, director of engineering, Stout Research Division of Consolidated Vultee Aircraft Corp., told the meeting that "the helicopter today is in the same stage as the airplane was in 1904-05, and in the helicopter field Igor Sikorsky is what the Wright brothers were to the airplane." Mr. Waterman stated that he believed that the possibilities of the helicopter had been over-sold by the press, that they were specialized machines limited to low speeds and therefore short hauls, and that his firm would be satisfied if within the next six months it could produce a helicopter that would even fly. Most proximate use of the helicopter, Mr. Waterman believed, would be to transport mail, and later passengers and light loads of air express from downtown termini to the airport. He discussed current experimental models stating that "a big name in shipbuilding" is working on an experimental helicopter design.

The "flying wing" type of airplane has some future for large, low speed cargo carrying because of ease and flexibility of loading, but he ruled it out for high speeds because of aerodynamic design consideration.

E. J. Foley, assistant to the vice-president (engineering), American Airlines, Inc., acknowledged that combination passenger and cargo airplanes would "continue to be a predominating vehicle in air cargo transportation for some time to come," probably a low wing aircraft for safety consideration. In an all-cargo plane, the high wing design would, he said, offer desirable features. He warned against oversize aircraft as restricting flexibility of service and that performance as related to cost would be determined by service to be rendered. The tricycle landing gear, because it provides a practically level floor in ground position, has, he said, a practically certain future in air cargo transport.

Hope that a consumer rate of 15c. per ton mile could be attained by the air transport companies in the post-war period, thus opening up to them a vastly larger market, was expressed by William A. M. Burden, special aviation assistant to the Secretary of Commerce, at the banquet meeting. He held a billion ton miles of air cargo transport as a post-war potential, compared to 5,250,000 ton miles of air express in 1941. He acknowledged that air rates might and would be higher than surface rates and still the airways would draw the business because of other considerations.

Dec. 4, 5 and 6, 1944, were set as dates of the next air cargo meeting to be held at Chicago.

Allotments for Huge Amounts of Steel, Copper, Aluminum Unused by Aircraft Firms

Dayton, Ohio

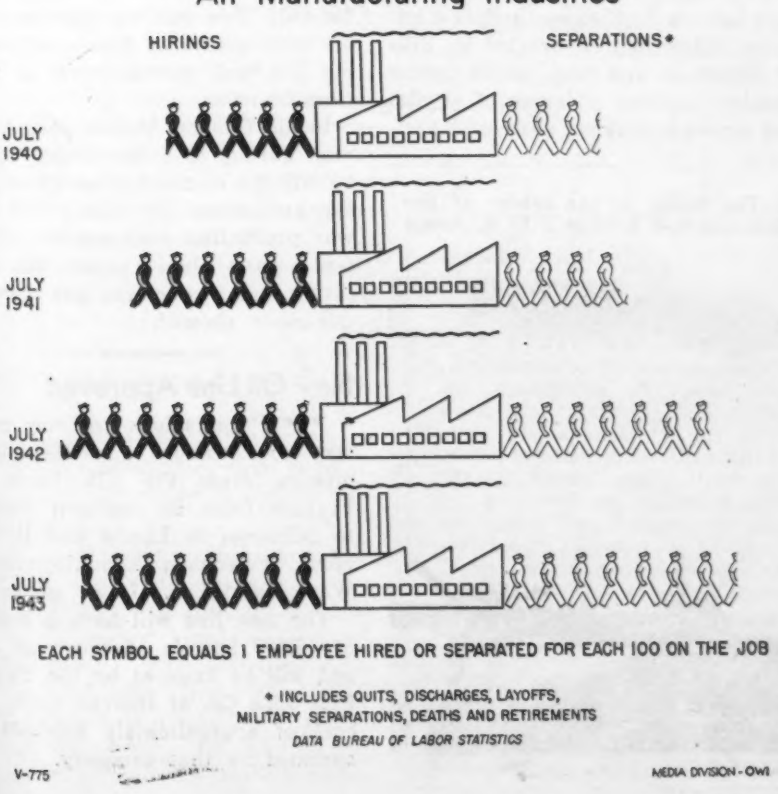
• • • **"Over** 100,000 tons of steel allotments; 22,000,000 lb. of copper allotments and 85,000,000 lb. of aluminum allotments for the fourth quarter were returned as unused to the Aircraft Scheduling Unit by the aircraft industry. These returns are roughly 20 per cent of the gross amounts handed out to the industry."

This statement has just been made by Col. E. W. Rawlings, newly appointed administrator of the ASU at Wright Field. The facts are based on an intensive study of fourth quarter aircraft allotments by the ASU.

The ASU a Wright Field determines requirements and allocates materials, tools, and equipment needed to maintain aircraft production schedules. It is composed of Col. E. W. Rawlings, administrator and representative of the Army Air Forces; Capt. C. H. Gillilan, U. S. N., for the Navy Bureau of Aeronautics; and Col. W. S. Cave for the British Air Commission. It serves as the sole government agency authorized to contact the aircraft industry in the execution of delegated functions from the Aircraft Resources Control Office, of which T. P. Wright is director. ARCO is the executive agency for WPB's Aircraft Production Board and is designated as the claimant agency under the Controlled Materials Plan which the ASU operates for the air program.

The enormous turnback of allotments represents the aircraft industry's and ASU's achievement in the campaign against "attrition" in the aircraft industry—the failure of industry to place orders for steel, copper and aluminum up to the amounts authorized by CMP allotments.

"Cooperation of the aircraft industry with the Aircraft Scheduling Unit in the elimination of 'attrition' has thus far been outstanding," Col. Rawlings continued. He emphasized, how-



ever, that the job has just begun and that more cooperation and work is necessary.

Most encouraging aspect of the "attrition" problem is the improved material situation. Sufficient capacity exists now and in the future to take care of all valid aircraft demands. Moreover, ASU policy is to hold allotment reserves large enough to permit immediate processing of necessary supplemental requests.

Col. Rawlings stated that these conditions should prevent allotment requests in excess of actual requirements and should limit the holding of unused allotments in any significant amounts.

After CMP went into effect in the second quarter of 1943, one result of the operations was the failure of industry to place orders for steel, copper, and aluminum up to the amounts authorized by CMP allotments. This practice has been labeled with the high-sounding military term "attrition." "Allotment waste" would probably be a more descriptive phrase.

The Aluminum and Magnesium Division WPB records on second quarter aluminum order placement showed a "waste" of allotments, but this was dismissed by the Claimant Agencies on the grounds that the confusion attendant on the transition to CMP operations was too great to accept such developments as facts.

When third quarter operations again showed the existence of sizable "waste," the ASU set out to discover what it was all about, Col. Rawlings stated.

"Attrition is common to all war industries and does not exist solely in the aircraft industry. The aircraft industry's record of order placement is the best for almost every individual material shape alloted under CMP. But its failures have been spotlighted by the favorable allotment treatment received from CMP officials, and by the complaints of claimant agencies whose allotments have been cut because of aircraft priorities," he added.

In approaching the problem for fourth quarter aircraft allotments, the Aircraft Scheduling Unit in cooperation with the industry decided to find out what caused attrition and to campaign toward its elimination.

The three most important causes of allotment waste were found to be failure to meet prescribed production schedules, the heavy volume of subcontracting, and the fear psychology developed by months of acute raw material shortages. Inadequate personnel and weak material control systems were also important factors.

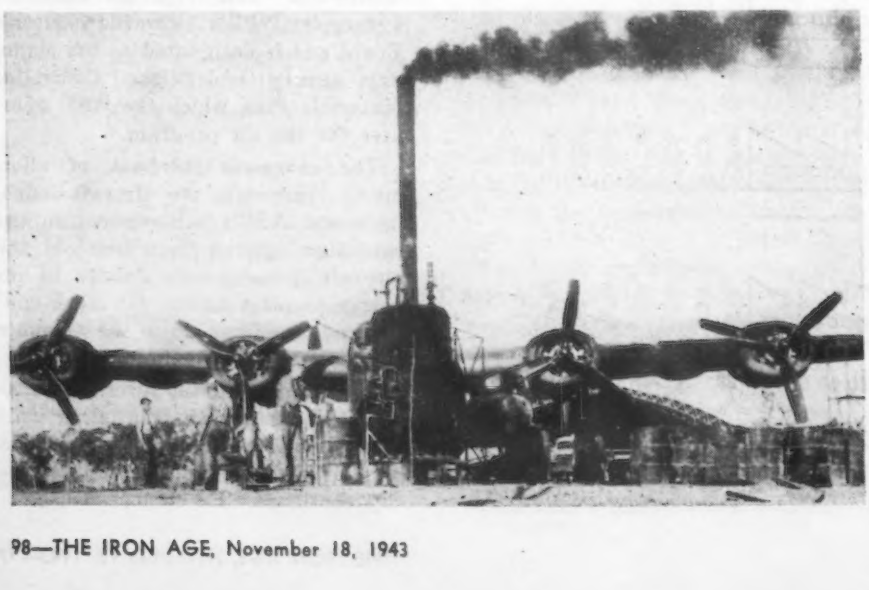
Col. Rawlings stated the belief that most of the causes are disappearing.

"The aircraft industry's interest, as well as ASU's, in the attrition problem is plain," Col. Rawlings emphasized. "Preferential allotment will not continue to be received unless unpadded requests are submitted and unless orders are placed with mills equal to allotments. Pressure is being exerted now for sharp reductions in the poundages granted to ASU for distribution to the aircraft industry for the first and second quarters of 1944. If such developments should occur certain plane makers would be hurt because ASU cannot reduce allotments below figures dictated by Bills of Materials and past performances without invoking a degree of crystal ball gazing it does not possess. A horizontal cut would be the only possible means of passing on such allotment reduction to industry."

The real solution to the problem, Col. Rawlings stated, is adequate material control systems. All the aircraft companies realize this fact and for some time have been in process of installing and improving control systems to correct past deficiencies. In the meantime, the ASU has urged each company to take inventory on hand and on order into full account in making quarterly request for controlled materials; to check similar requests from their secondary consumers with uncompromising exactness; and to make immediate return of all allotments held by themselves or their secondaries that will not be used to cover definite controlled material orders.

ASU is now conducting a campaign for the prompt return of unneeded first and second quarter 1944 allotments. Final first quarter returns should be back to Wright Field now and final second quarter returns by Dec. 30. Form CMP-32 (ASU) "Consumers Return of Allotments" has been mailed to all aircraft industry prime consumers, but letters or telegrams may be used if preferred.

SPRING CLEANING IN AUSTRALIA: The boiler in the center of the picture provides a steam-bath for a four-engined B-24 at a U. S. Army Air Force Depot in Australia.



GM's Michigan Orders Totalled

Detroit

• • • **General Motors placed** orders during 1942 with 4,913 Michigan companies, for amounts totaling $384,307,433. This was an increase of 86 per cent over 1939 figure, representing the last normal year of peace time business.

In all, General Motors placed business during 1942 amounting to $1,390,572,624 in the United States. Of the companies furnishing GM with war production requirements, 43 per cent have less than 100 employes, and 74 per cent less than 500, the study showed.

New Oil Line Approved

• • • **Preparations are** now underway to construct an 82½-mile oil pipeline from the Elk Basin and Frannie fields in southern Montana to refineries in Laurel and Billings, Mont., Petroleum Administrator for War Harold L. Ickes announced.

The new line will have a capacity of 15,000 barrels of crude oil daily and will be financed by the Yale Oil Pipe Line Co. of Denver, Colo., at a cost of approximately $830,000 and operated by that company.

Support Strengthened to Have WPB Unwind Matters When Peace Comes

By DONALD BROWNE
Washington Bureau

Washington

• • • **Those who foresee a struggle** for authority over industrial demobilization between WPB Chairman Donald M. Nelson and Bernard M. Baruch are due for disappointment, a high administration official said on Tuesday.

Mr. Nelson, who has been a government-industrial leader in Washington for more than three years and has weathered many an official storm without public comment, is willing to stay on the job so long as he is needed, it is understood. Close friends of Mr. Nelson say that he is no quitter and also say that he has no political ambitions.

Influential Congressional groups believe that WPB should continue to pass out materials to manufacturers after the war in Europe ends. Ranking Senators say that this must be done to prevent a mad scramble among manufacturers for materials and manpower which might forestall production of most essential goods in the priority of the country's requirements.

The problem of holding the WPB staff after the resignation of executive vice-chairman Charles E. Wilson and operations vice-chairman H. G. Batcheller, who will soon return to their posts in private industry, will be met in the near future by clarification of WPB's duties by the President, it is assumed.

Justice Byrnes, who heads the Office of War Mobilization, could not be reached for comment but it is understood that Mr. Byrnes agrees with Congressional view on the duration of WPB's life.

It is possible that WPB will have greater responsibilities than regulating the rate of return to civilian production.

Informed observers here say that the new demobilization agency must have authority over contract termination, government surpluses and renegotiation. It was pointed out by a WPB spokesman that whoever is given the job as demobilizer must go beyond mere advice. He must be prepared to assume the full operating authority and responsibility of the new agency.

Mr. Nelson told a Congressional committee last week that he favored resuming civilian production as soon as war demands slacken enough so that plants, materials, machinery and manpower can be properly diverted from war production.

The orders limiting production of civilian goods are under study by WPB policy groups. One suggestion has been made that where materials are tightly controlled, limitation orders can be abolished, with CMP left to control distribution. This may be done even before the war in Europe ends. But materials will not be made available for civilian production until all military demands are met.

In other cases, such as the lumber and paper industries, where distribution controls are not so strict, the limitation orders would be retained, it is said.

Warehousemen to Discuss Surplus Stocks

• • • **A vast new WPB program** for channeling millions of tons of surplus steel into war production will be explained by T. W. Fitch, WPB Steel Division expert on redistribution, at the annual meeting of Steel Products Warehouse Association, Inc., on Friday, Nov. 19, at the Drake Hotel, Chicago.

In a talk to the more than 200 steel warehousemen and mill representatives expected for the meeting, Mr. Fitch will emphasize the part which warehouses, dealers, and distributors can play under the revised redistribution procedures now being established by the War Production Board.

J. R. Stuart, Chief, WPB Warehouse Branch; E. L. Wyman, Head, OPA Warehouse and Jobbers Section; Dean William H. Spencer, Chicago, regional director of the War Manpower Commission, and E. L. Shaner, Editor-in-Chief of "Steel" also are scheduled to speak at the public sessions of the meeting.

Two Aluminum Extrusion Plant Programs Halted by WPB

• • • **WPB on Nov. 13 halted** the construction of two major aluminum extrusion plants calling for the expenditure of a total of approximately $37-million. Following a determination that present extrusion facilities are adequate for all anticipated requirements, WPB ordered preference ratings revoked for construction of a $20-million plant by the Reynolds Metals Co. at Memphis, Tenn., and construction of a $17-million plant by the American Brass Co. of Waterbury, Conn., to be built at Columbus, Neb.

WPB Adds Zip To Zipper Making

• • • **WPB has removed all restrictions on the use of steel in the production of hooks and eyes, snap fasteners, and brassiere hooks made in any part of the country other than Labor Market Areas 1 and 2. Previously, quarterly steel consumption for these items had been restricted to the average quarterly use in the year ending June 30, 1941. The amended order also permits use of steel in production of such items as buckles, burrs, clothing trim or ornaments, corset clasps, eyelets, hose supporters and closed type steel buttons for use on coated fabric garments.**

Brooklyn Bridge Transit Lines to Aid Scrap Drive

Washington

• • • **Estimating that 7300 tons** of steel scrap from the project will be recovered, WPB on Nov. 13 permitted the New York City Board of Transportation to resume elimination of rapid transit lines from the Brooklyn bridge. This action cancelled the board's Oct. 5 revocation of the project and was taken when WPB decided that the scrap would be available for war purposes, the original intent in approving the project. WPB said that when the revocation was issued, there was no assurance the salvage would be used for scrap.

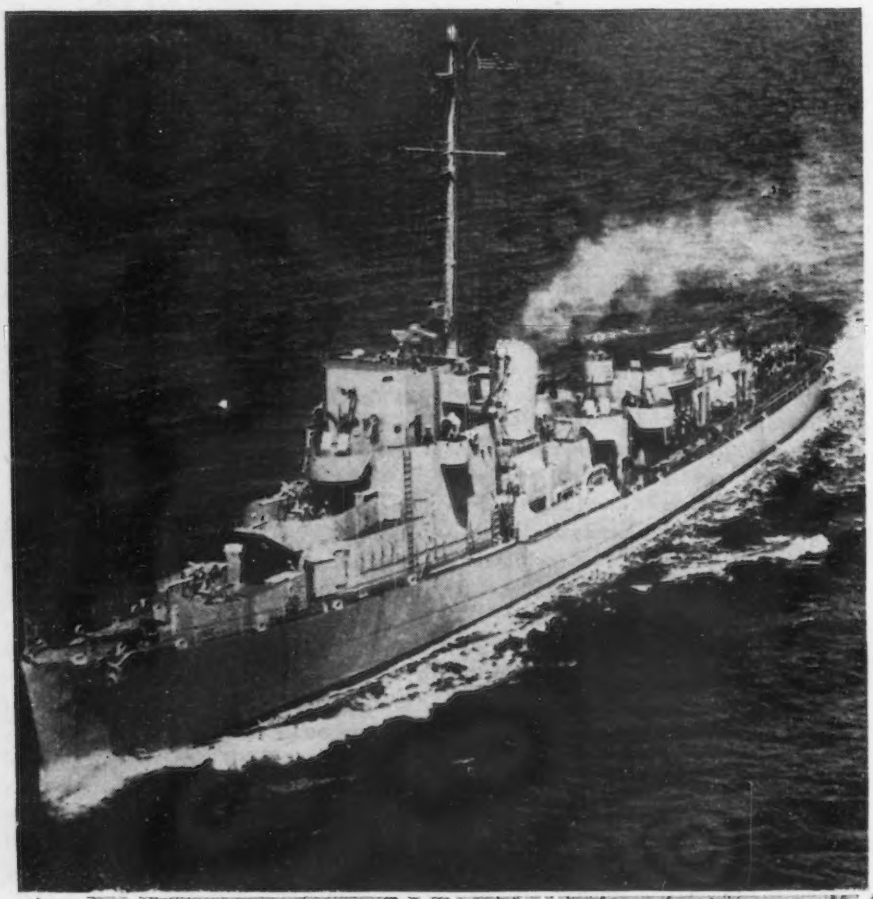
. . . Large Assembly Units Assist Construction of

o o o

• • • President Eugene G. Grace of the Bethlehem Steel Co. sometime ago promised that Bethlehem shipyards in 1943 would be delivering a ship a day. That program is on schedule. This has been done partially by constantly expediting assembly line production through improved methods of fabrication.

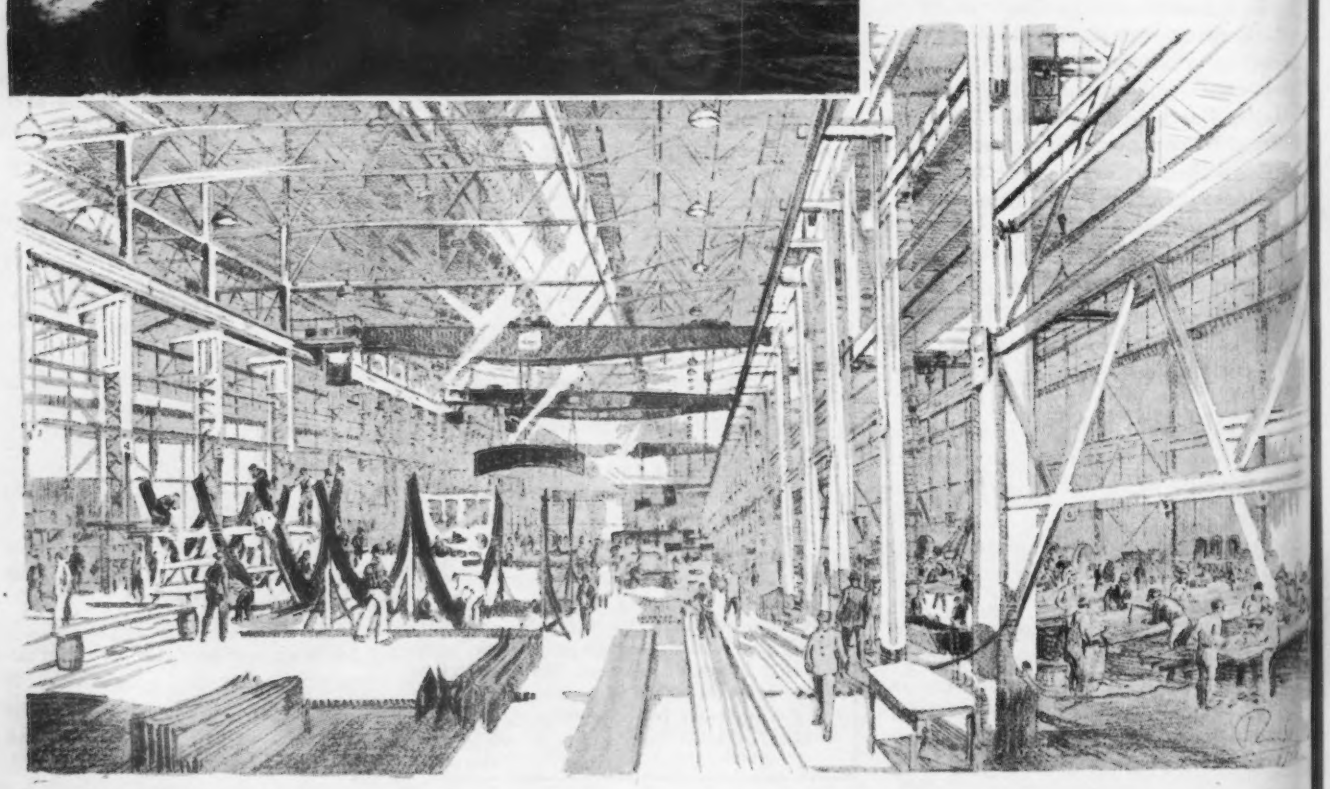
The company's Bethlehm-Hingham streamlined yard, 15 miles south of Boston, only an expanse of bare ground in February, 1942, has progressed so far in fast construction that it set a world record Nov. 3 when it delivered the 1300-ton destroyer escort Reynolds within 25 days of the time the keel was laid. It thereby received a message of warm praise from Admiral E. L. Cochrane, Chief of the Bureau of Ships, who conceived the design of the DE three years ago. At ceremonies on that day the ship was delivered to the United States Navy, which in turn placed it in the service of the British Royal Navy for anti-U-boat and convoy duty in the Atlantic. The Bethlehem-Hingham yard on Aug. 13, 1943, was honored with the Army-Navy E for outstanding achievement.

The record set in building the Reynolds surpasses by more than 20 days the mark set by Bethlehem in the First World War when it delivered the destroyer Reid to the American Navy 45½ days after laying of the keel, a new record up to that time. The DE is a larger, more powerful ship than the World War I destroyers of the Reid class. Emphasizing



o o o

THE DE IS BORN: Below is the giant "Steel Mill" of the Bethlehem-Hingham Shipyard where DE hulls are pre-fabricated. Other views show the product afloat. Destroyer escort vessels are a by-product of the 110 ft. wooden SC vessels, the 176 ft. PC's. They are 308 ft. superspeedsters, termed pure poison for submarines.



Destroyer Escort Ships

° ° °

By L. W. MOFFETT
Chief of Washington Staff

° ° °

even more strikingly the rapid work on construction on DE's at the Bethlehem-Hingham yard is the fact that the first group of the Reynold's type of ship built for this war required 302 days to complete. The next group in her class required 206 days. The yard is busy constructing additional destroyer escorts which will join the Reynolds in the British Navy.

The design of the DE has a direct bearing on its speedy erection. The ship is so designed that it is assembled into large welded sections, running up to several score tons. Welding is done on the ground rather than on the ways. By putting the ship together in large units a greater amount of engineering material can be installed than would be the case if erection was done in small units. This, however, does not restrict letting jobs to small fabricators. Smaller pieces can still be subcontracted.

In doing welding on large assembly units on the ground the welders themselves can work more and make better arrangements than they could on the ways. Furthermore the sections can be readily turned.

Fabrication is done in a well laid out plant 1400 ft. long, 300 ft. wide and 52 ft. high. The fabricated sections are carried by crane to a special transfer car on which they are transported to the adjoining assembly yard. After the units are assembled they are transferred to the ways, clamped and welded into the ship.

But no matter how modern the plant or methods, good ships cannot be produced speedily without a trained working force. The Bethlehem-Hingman yard engaged 23,000 workers. Of this number 3000 are women. These employees come from a wide variance of vocations. They include doctors, lawyers, bartenders, farmers and others. Most of the farmers were recruited from Maine.

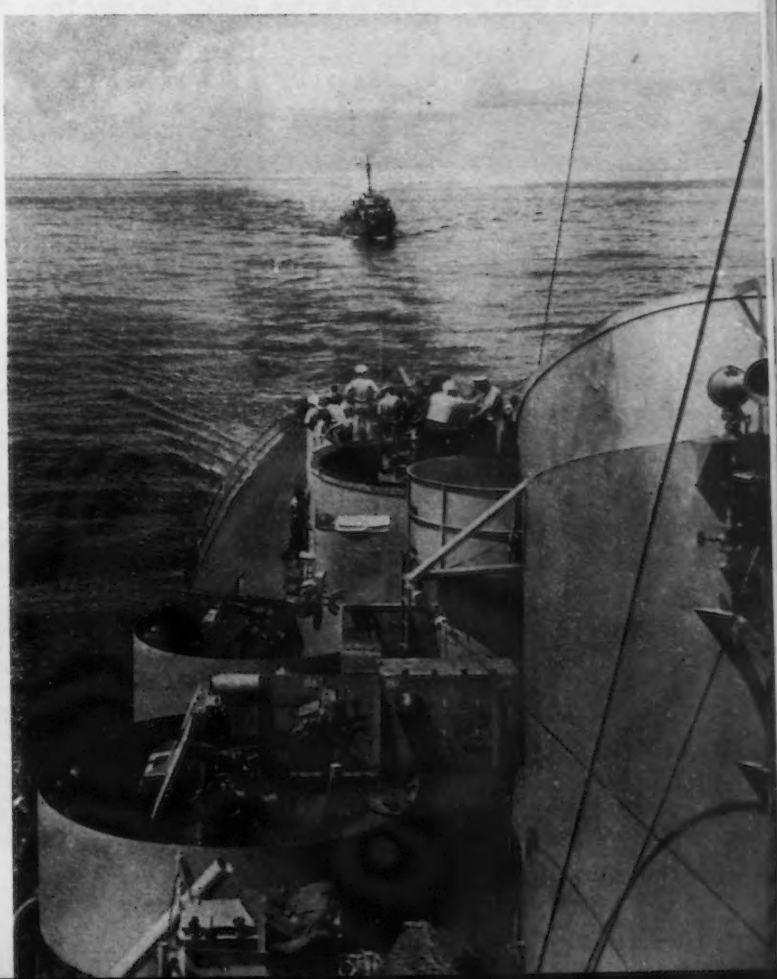
When recruited the workers are sent to a special school where prospective welders are given an intensive six-months' course. The women like the men have proved adept.

The Reynolds type of destroyer escort is 308 ft. long and 36 ft. in breadth and is known in naval circles as the "Terrier of the Sea." Her superstructure has been described as a "cross between an overgrown submarine conning tower and a gigantic tank turret."

The wheel-house, bridge and chart-house are completely incased in protective steel armor. The two stepped-down gun platforms just forward are among the features which contribute to modern appearance.

Aft of the bridge are the short mast and the squat stack, flanked and followed by odd-shaped bulges, platforms and crannies which provide additional gunmounts and space for torpedo tubes.

The vessel has been described by Naval men as being something between a corvette and a modern destroyer in size and Naval men pridefully declare that she can outrun the fastest corvette or submarine.



Latin American Steel Programmed for 1,400,000 Tons; Mexico and Brazil Lead

New York

• • • **Latin American nations** will have a combined capacity for producing approximately 1,400,000 tons of steel ingots and castings upon the completion of certain new plants now under construction, says the American Iron & Steel Institute. At that time, steel capacity in all of Latin America will be somewhat less than the size of the steel industry of prewar Poland and somewhat more than that in Sweden.

Brazil and Mexico together will account for close to 85 per cent of the total Latin American steel industry. Plants in Peru, Argentina, Chile and Colombia together will represent a little more than 15 per cent.

Mexico, with an estimated 600,000 tons of annual steelmaking capacity, most of which has been in operation for some years, is the leading steelmaking nation south of the Rio Grande. Upon completion of a new government-sponsored steel plant in Brazil however, that country will rank close behind Mexico with approximately 570,000 tons of annual steel capacity, of which an estimated 330,000 tons will be represented by the new plant under construction.

In Peru a proposed government steel plant for which construction contracts have already been awarded, is expected to have a potential capacity of 140,000 tons of steel ingots a year.

Argentina, lacking coal, is not equipped to refine iron ore, but does have steel plants with an aggregate capacity estimated at 65,000 tons of ingots per year.

Plants in Chile are estimated to be able to produce approximately 20,000 tons of steel. A plant under construction in Colombia has been reported to have an eventual capacity of 5000 tons of steel ingots.

Completion of Latin American steel plants now under construction will raise finished steel capacity in that area to approximately one million tons of products per year, about 50 per cent of the total consumption in Latin America in 1936. However, it is not likely that the full range of products generally imported by Latin American nations can be supplied from domestic plants.

o o o

Granite City Adds Second Open Hearth

Granite City, Ill.

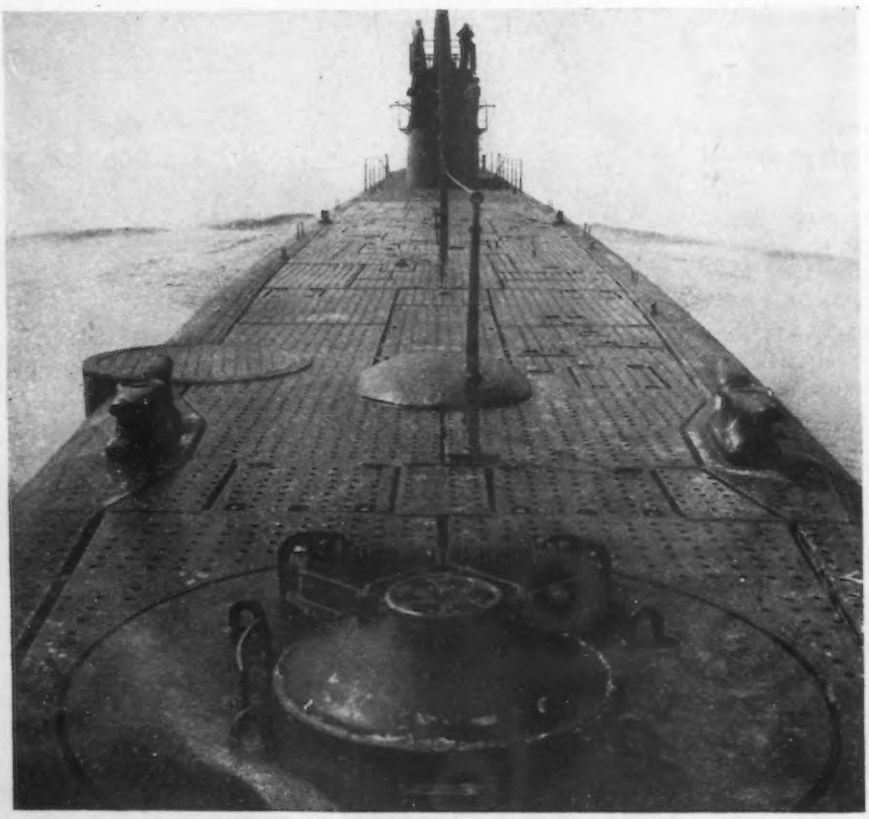
• • • **Plate production** received another boost Nov. 12 when Granite City Steel Co. put the second of three new DPC open hearth furnaces into production. The company stated that when all three were in production, an event anticipated before Dec. 1, its steel production would be increased by about 75 per cent, most of which would go into ship plates.

The first of the new open hearths built at Granite City for the Defense Plant Corp. was put into production on Nov. 3. When the third comes in later this month the 75 per cent capacity increase claimed by the company should boost annual tonnage for this producer to about 700,000 tons of ingots per year.

To handle the additional tonnage the firm has also built additional soaking pits and has added a slab heating furnace. The announcement said that about $12,000,000 had been expended by DPC.

Previously, Granite City Steel's facilities included 10 stationary open hearth furnaces and 10 four-hole soaking pits. The rolling mills included: A slabbing mill, blooming mill, two sheet bar mills, a continuous hot strip mill, strip and sheet cold finishing facilities and tin mills.

UNDERSEA RAIDER: The deck of a submarine calls for a sure foot, even on a quiet sea. This is a view looking forward from the stern.



Link-Belt Co. Purchases Distributor's Plant and Stock

Chicago

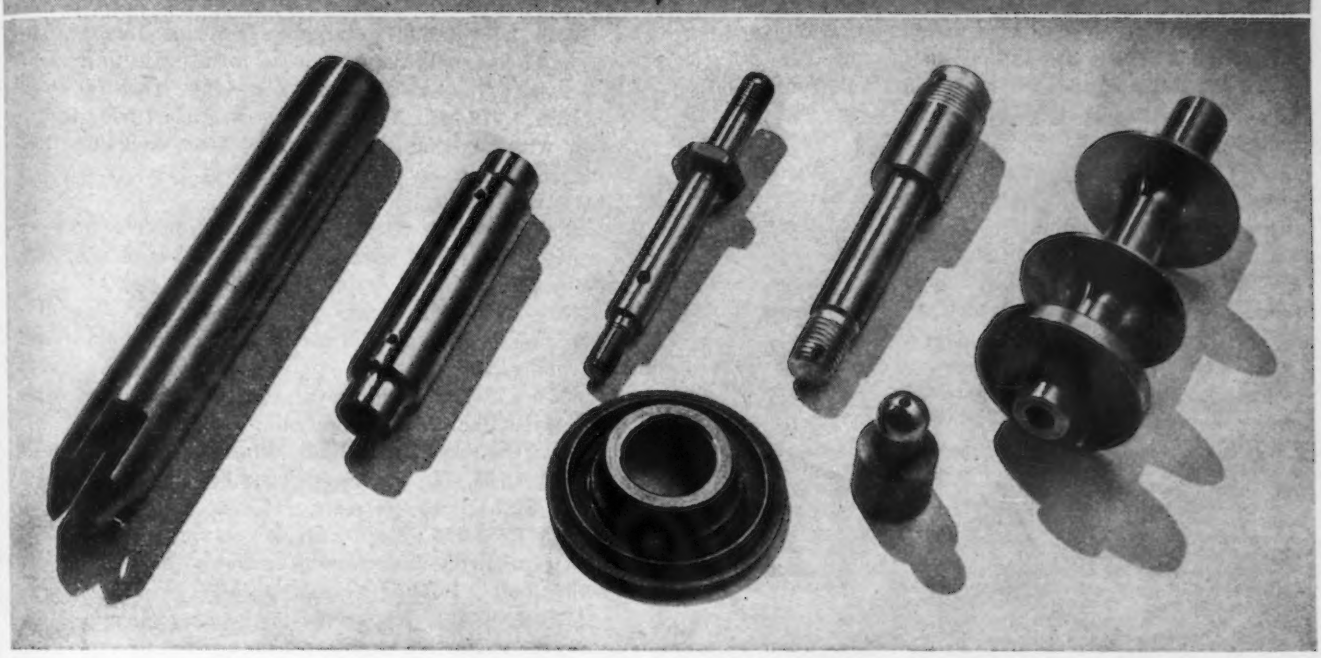
• • • **Link-Belt Co., Chicago,** has purchased the manufacturing plant and inventory of Link Belt Supply Co., Minneapolis.

For more than 48 years, the Supply Company has been authorized distributor of Link-Belt products in the Minneapolis-St. Paul territory. The entire organization will be retained, stocks expanded as rapidly as possible, and manufacturing facilities improved, the company states.

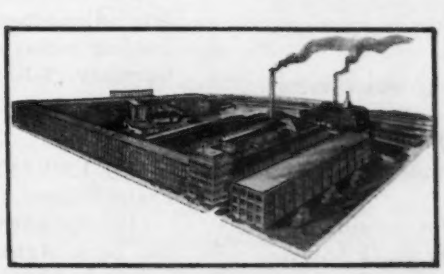
Ray S. Wood, since 1925 district manager of the Link-Belt positive drive division, with headquarters in Detroit, has been appointed plant manager at Minneapolis.

First in the Field...

In More Ways Than One



These aircraft engine parts, formed on automatic screw machines, require highly specialized progressive secondary equipment, and skilled workmanship. In *Hartford's* vast production are thousands of different precision parts that help make possible today's high-powered aircraft engines. • Established in 1876, *Hartford* manufactured the world's first automatic screw machines. Back in World War 1 *Hartford* made parts for Liberty engines. In 1925, when the drive started for precision in aircraft engine parts, *Hartford* pioneered parts for 410 H. P. engines. Today, we're making parts for the world's fastest 2,000 H.P. fighter engines. The ultimate in power and speed ... and so in greater precision . . . is not even in sight • *Hartford's* background includes participation in every important development in screw machine product manufacturing and finishing . . . From such a background flows the quality, precision, exactness and production uniformity so vital to war . . . and post-war . . . production • Facilities for additional production become available from time to time even now. And, when V-day comes, if you use parts that need the precision developed by *Hartford* for fighting engines, remember the first in the field. Hartford Machine Screw Company, Hartford, Connecticut.



★

HARTFORD

Offering Ideas for Small and Large Firms Alike—

Third Installment of Seized Metalworking Patents

• • • **The license agreement** which firms must sign with the U. S. Alien Property Custodian in connection with the use of seized patents is a comparatively simple document. It is divided into eight short sections, the longest of which is barely 400 words long.

Terms and conditions include the following stipulations: The license is royalty-free, non-exclusive and non-transferable; the Custodian has no rights to or under any invention or patent of the licensee; the Custodian will defend his authority in the event of litigation brought against the licensee in connection with the patent; the licensee must report on his use of the licensed patent; the Custodian has the right to suspend or cancel the license after a hearing, and so on.

The above is based on the agreement Form APC-30, February, 1943. It is understood a new form with slight changes is going to be issued soon.

Column for column, the lists of available enemy patents being printed in the news section of this magazine offer far more post-war ideas than any other post-war literature today. For a comparatively small fee it is possible for a company to obtain the right to use a desired patent which has been seized by the U. S. Government because of the war. A small firm may obtain the right to employ the patent even though many others are using it.

In the news section of this magazine Nov. 4 on page 95 there appeared a full explanation of how to proceed in the event patents of potential value are noted. Also in the Nov. 4 issue there appeared Class 205, Metal Drawing; Class 185, Motors; Class 7, Compound Tools, and a start on Class 22, Metal Founding. Last week, Nov. 11, Class 22 was completed and a start was given on Class 153, Metal Bending. This week Class 153 is completed below, followed by Class 305, Wheel Substitutes, and a start on Class 51, Abrading. On July 8 this magazine printed lists of hundreds of seized patent applications believed open for licensing on the same basis as the patents.

In each item listed, the sub-class number appears first, in parenthesis; followed by the patent number, the description, the inventor's name, his nation and the date the patent was granted.

Class 153—Metal Bending—Continued

(2) 2,071,596. Method for hot straightening plates. F. Ungerer, Germany. 2-23-37.

(2) 2,251,741. Mechanism for producing curved metal articles, especially curved channels or other profilated sheet metal strips of open cross section. R. Korting, Germany. 8-5-41.

(3) 2,095,533. Method of producing arched metal panels. Frederick Schmidt, Germany. 10-12-37.

(10) 1,981,732. Method and device for mechanically attaching suspension pins to the looped draw tape of fly catchers of the adhesive band type. F. Kaiser, Germany. 11-20-34.

(11) 1,990,255. Machine for flanging sheet metal plates. X. Sonntag, Germany. 2-5-35.

(15) 2,055,955. Machine for bending iron rods and sections, particularly iron used in concrete structures. A. Wagenbach, Germany. 9-29-36.

(16) 1,944,651. Universal machine for canting and circular bending provided with a bending check adjustable in the vertical direction. A. Wachter, Germany. 1-23-34.

(16) 2,025,222. Universal flanging and bending machine with fixed bottom plate or anvil block and vertically movable clamp head or top clamp plate arranged between two frames. August Wachter, Germany. 12-24-35.

(20) 1,837,196. Machine for bending metallic rods or bars used particularly in reinforcing concrete work. Carl Berges and Wilhelm Berges, Germany. 12-22-31.

(21) 1,724,715. Machines for matching and doubling sheet metal and sheet metal packets or piles. Emil Koch, Germany. 8-13-29.

(21) 1,734,881. Stamping tools for striking up portions of flat metal keys so as to form projecting curves on same. Gustav Ringelhan, Germany. 11-5-29.

(28) 1,779,185. Apparatus for manufacturing section iron with box-shaped cross section from iron tubes having comparatively thick walls. Josef Meiser, and Wilhelm Kohler, Germany. 10-21-30.

(28) 1,826,813. Device for use in forming undercut sections of rolled metal. Herman Oberschulte, Germany. 10-13-31.

(29) 2,193,050. Means for flanging the edge of a round opening in a sheet metal blank. Matthaus Wiest, Germany. 3-12-40.

(32) 1,781,567. Apparatus for producing bent pipes of correct lengths, straightening the ends of the bent pipe at the same time. R. Bohling, Germany. 11-11-30.

(32) 1,783,177. Device for bending a typewriter type lever. Hans Luce, Germany. 12-2-30.

(32) 1,857,583. Apparatus for straightening ends of bent pipes while maintaining uniform thickness of the wall. Rudolf Bohling, Germany. 5-10-32.

(32) 1,888,891. Apparatus for bending pipes used for carrying media under pressure to a curve of very small radius of pipe having very thick walls. Alfred Schmidt, Germany. 11-22-32.

(32) 1,915,257. Machine for manufacture of sheet metal tubes and other tubular members. Karl Breitenbach, Germany. 6-20-33.

(32) 1,951,334. Method and apparatus for manufacture of pipe bends and serpentines by means of a curved mandrel. Rudolf Bohling, Germany. 3-26-34.

(35) 1,723,098. Method and apparatus for straightening sheet metal plates. F. Ungerer, Germany. 6-29.

(38) 1,707,991. Device for bending rails, pipes and the like. Anton Oskamp, Germany. 11-9-29.

(40) 1,644,555. Spiral gripping device for bending machines. Anton Wagenbach, Germany. 10-4-27.

(40) 1,795,188. Bending machine for bar, rod and/or profile iron. Anton Dagenbach, Germany. 3-3-31.

(40) 1,847,200. Bending machine for bending seamless boiler tubes, welded steam and gas pipes on a small bending radius and in a cold state. Ewald Vollmerhaus, Germany. 3-1-32.

Copyright, 1943

(40) 1,919,839. Pipe guide on pipe bending machines. Franz Hilgers, Germany. 7-25-33.

(45) 2,231,306. Method of and means for bending iron bars. Anton Wagenbach, Germany. 2-11-41.

(46) 1,903,799. Bending arrangement for bending machines adapted to bend various forms. Anton Wagenbach, Germany. 4-18-33.

(46) 1,933,363. Device for bending metal bars in which bending discs bend not only the end hooks but also intermediate portions. Heinrich Bottner, Germany. 10-31-43.

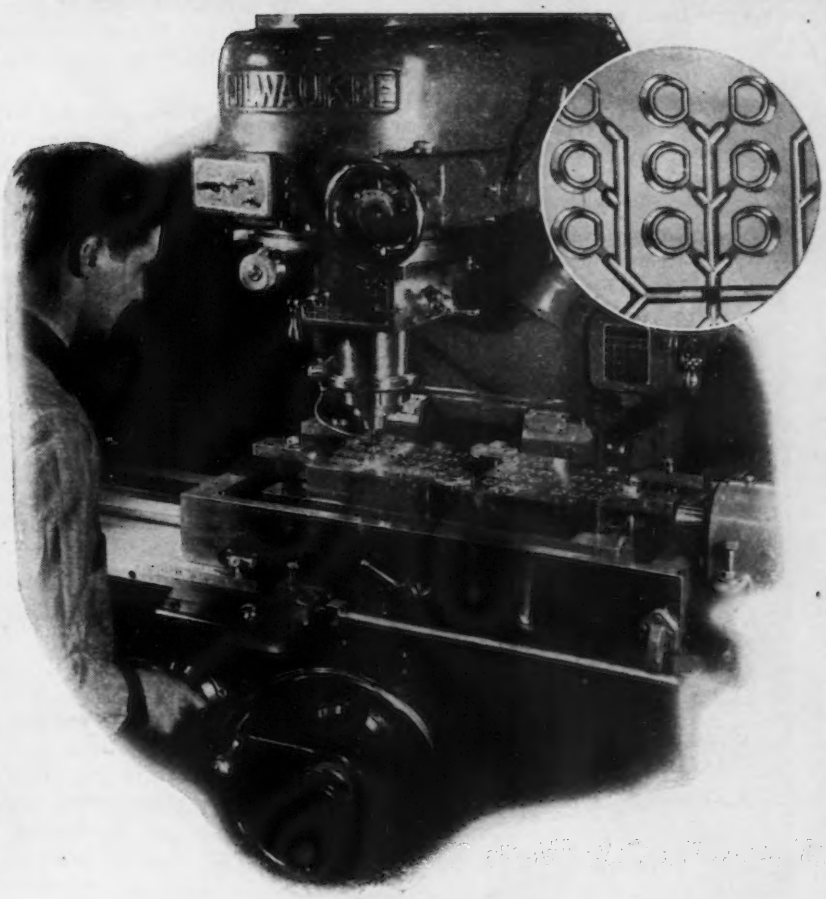
(48) 1,648,161. Machine for producing tubular bends and coils and for expanding tubes. Rudolf Bohling,

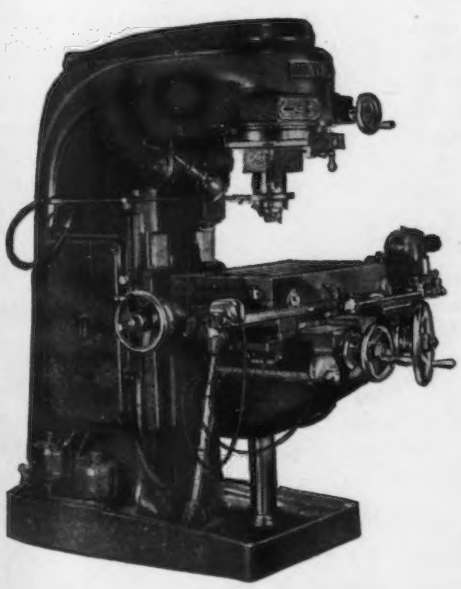
(Continued on Page 148)

24 CAVITY MOLD FINISHED IN *18* HOURS!

Estimated time required by other methods was more than 100 hours!

THE two halves of the 24 cavity mold were aligned and properly spaced on the Milwaukee Rotary-Head Milling Machine table. The first milling operation was performed on the first cavity in the back row. Then, by moving the table the proper distance — the same operation was performed on the next cavity. Since the cavities in the two mold halves were identical, this and succeeding operations were simply carried over to the opposite half of the mold. Each operation was readily performed in proper sequence and the entire 48 impressions of the 24 cavity mold were machined completely at a single set-up in 18 hours.





KEARNEY & TRECKER'S
ROTARY HEAD MILLER

The Most Versatile Machine Ever Designed for Mold and Die Work

DIRECT . . . mills mold cavities in a single set-up without the aid of templets or models.

ACCURATE . . . chances for error are eliminated because there is no change in set-up. Exact control of all combinations of cutting movements—possible only with this machine—transmits mathematical precision to the work.

FAST . . . initial job preparation and set-up time is reduced to the minimum. Accurate performance of the machine saves operator's time and rapid production of intricate molds and dies is the result.

•

Write for Bulletin No. 1002C for complete information on the Milwaukee Rotary-Head Miller and the accurate and rapid production of all types of molds and dies for plastics.

Rotary Head Milling Machine
•
Autometric Jig Borers
•
Center Scope

Kearney & Trecker Products CORPORATION
Milwaukee, Wisconsin
Subsidiary of Kearney & Trecker Corporation

Milwaukee Face Mill Grinder
•
Milwaukee Midgetmill
•
Milwaukee Speedmill

Labor Front Termed Far from Quiet

New York

• • • **Even a summary glance** at recent happenings on the labor front indicates that it is far from quiet and may be on the verge of new uprisings. The unions are extremely active, strikes are still hurting production, the miners while appeased are still recalcitrant in some areas, new wage demands by the unions are in the making and constant vigilance and jockeying by the government has been necessary to keep the manpower situation within bounds.

Currently, the CIO has publicly announced that strides will soon be taken to raise not only the wages of steel workers but also those of all its membership numbering about 900,000 in many trades. AFL unions may be expected to follow suit. The railroad workers' wage demands are not settled but a strike in transportation does not seem imminent. The white-collar workers of several industries including steel and aviation are being organized preparatory to demands.

Strikes

A strike of 1217 die setters of the Ford Willow Run bomber plant was ended ironically enough on Armistice Day through a back to work demand of the union. It last only two days but was reported to have affected 4000 workers.

Other strikes affecting Detroit war contracts concluded within the last 10 days include walkouts at GM's Buick foundry, Bendix Aviation Corp. at Owosso, Mich., Cadillac Malleable Iron Co., Cadillac, Mich.

Also settled was the strike of 350 blooming mill workers of the Republic Steel Corp. plant at Buffalo after a full week. The strike laid off 1600 workers per day, shut down eight open hearth furnaces and one blast furnace. It started Nov. 4 and ended Nov. 11.

All departments of the American Steel & Wire Co. plant in New England except the open hearths are reported this week closed by a strike. At least half of the 4000 employees are reported out.

Recalcitrant Miners

Pittsburgh

• • • **Only about 25 per cent** of Pennsylvania's 1220 mines and probably less than half of the state's 110,000 bituminous miners were producing on Armistice Day in protest against an order by Fuel Administrator Ickes ruling out premium pay for holidays. A score of steel company "captive" mines including those owned by Jones & Laughlin Steel Corp., Republic Steel Corp., Weirton Steel Co., Wheeling Steel and Crucible Steel were reported idle Nov. 11.

•

Birmingham

• • • **Although actual operations** in the Alabama coal mine field have returned to near normalcy there is little belief here that a permanent solution has been reached to end the strikes authorized and unauthorized—that have plagued the coal industry of this state for months.

A substantial number of Alabama coal mine operators contend they can't stand the increased costs, whatever they may be, without immediate compensatory adjustment in price by OPA.

•

Manpower Moves

Buffalo

• • • **In a run-off** National Labor Relations Board election, the CIO's United Office & Professional Workers Union won the right to represent some 4500 office and professional workers of the Curtiss-Wright Corp. Airplane Division in Buffalo. In a previous election neither the CIO union nor the opposing Association of Machinists, AFL, received a majority. More than 1000 eligible employees abstained from voting in the second election.

•

Birmingham

• • • **The Birmingham** Labor-Management Committee of the War Manpower Commission has adopted and put into effect a revised stabilization plan for the 11 counties in Alabama that comprise the Birmingham area.

•

Buffalo

• • • **Evidence has been** found that a number of employers in the Buffalo-Niagara area are violating the controlled referral provision of the local employment stabilization plan.

The violators have been employing persons direct instead of through the USES.

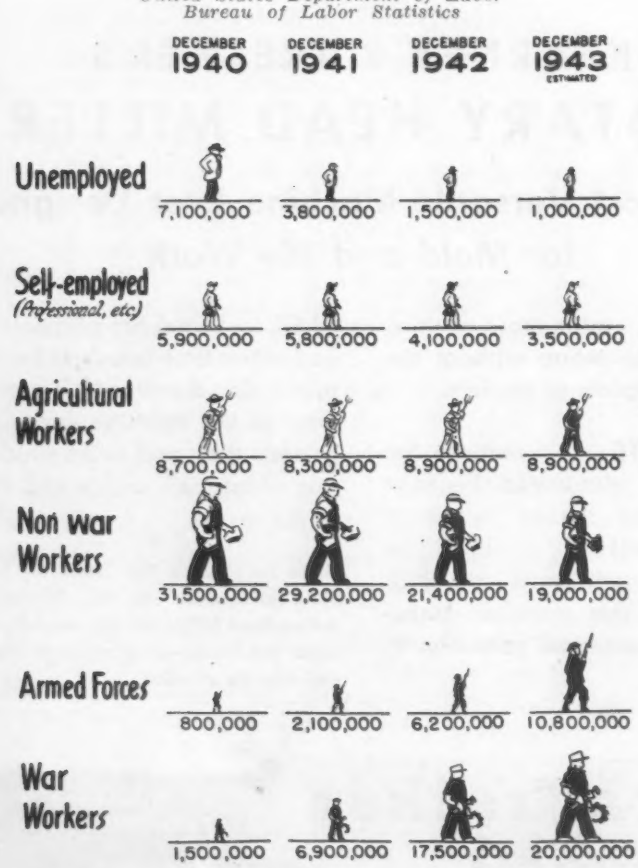
Hire 17 to Gain 3

• • • OWI reports that the nation's major war plants are finding it necessary to hire 17 workers monthly to get a net increase of three for every 100 employed. Latest figures show that workers are not being hired fast enough to replace those leaving industry.

WMC reports on turnover come from 16,900 plants employing 14,900,000 persons and cover the month of June. Seven out of every 100 workers left their jobs during the month. Five of the seven quit of their own volition. The other two separations are accounted for by layoffs, discharges, military calls, deaths, etc. For every 100 employees, 8.6 new workers were hired, making a net gain of 1.6 workers.

WAR SHIFTS IN LABOR FORCE

United States Department of Labor
Bureau of Labor Statistics



NEED ANY HELP...

on the PROCUREMENT of STAINLESS STEEL?

If so, RUSTLESS can help you.

The following are only a few of the factors which daily confront the purchaser of Stainless Steel:

1 • WPB Regulations—This demands a knowledge of CMP. Basic Regulations M21a and M126, allotment procedure, allowable end uses, scheduling and minimum quantities.

2 • Delivery—The buyer must know lead time—and if quick delivery is required, whether an item can be secured from mill warehouse or frozen stocks.

3 • Alternates—Choosing alternates often saves valuable time.

4 • Government Inspection—When required at mill, inspection involves specification detail, notification of buyer's proper local inspection office and a knowledge of the time consumed by inspection tests.

5 • Fabrication—Suggestions before ordering may eliminate a fabrication problem later. Intelligent help after delivery paves the way for smooth production.

RUSTLESS, devoted exclusively to the manufacture of Stainless Steel, is in daily contact with these and other procurement problems. Our familiarity with your difficulties enables us to give you immediate, up-to-the-minute information on your requirements. Write or wire us . . . RUSTLESS is anxious to render helpful service at all times.

If It's Urgent,

Ask Rustless By Phone. (Service 24 hours daily—7 days a week).
Call Wolfe 5400, Baltimore, Md.

RUSTLESS IRON AND STEEL CORPORATION

BALTIMORE, MARYLAND

SALES OFFICES: BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DETROIT
LOS ANGELES • NEW YORK • PHILADELPHIA • DISTRIBUTORS IN PRINCIPAL CITIES

BUY WAR BONDS AND STAMPS

WHEN YOU WANT TO KNOW ABOUT STAINLESS

Ask Rustless

Producing STAINLESS STEEL Exclusively

Prospects of China in Post-War Era Are Rated Highly by Experts

New York

• • • Experts who know the Orient say China can be rated highly among the nations offering bright prospects for post-war industrial and commercial expansion. The United States stands an excellent chance in reaping a good part of the benefits offered by this expansion if plans are made to shift American production of wartime necessities to the production of China's many post-war requirements.

Imported machinery, construction materials and production equipment of all kinds will be needed in supplementing China's relatively small industrial scale. Mining equipment will be needed too. First in the way of finished goods, the new China will need communication and transportation finished goods for highway and railway construction work. The value of these goods will run into enormous figures for rolling stock, land line telegraph equipment, construction and maintenance machinery, trucks and tires will be needed. One Chinese writer remarked that "It will take many national bankers to finance all of our needs."

One of the most eloquent and militant evangelists for the commercial future of the Orient from the viewpoint of the United States is Julean Arnold, longtime consular representative in China and now chairman of the China Council, resident on the Pacific Coast. Mr. Arnold points out that in China alone are 450,000,000 people, one fifth of the human race, almost equal to the entire population of Europe, three and a half times the population of the United States and five times that of South America. Although China now has 10,000 miles of railways, he estimates it needs 60,000 miles. At $50,000 per mile, this would require a modest order for three billion dollars of railway equipment. Although there are now only 75,000 motor cars for the 75,000 miles of roads, there is need and opportunity for a million miles. Possibilities for hydroelectric development on the Upper Yangste River are such that the industrial future of China should approach a United States of the Orient.

China's plans for national reconstruction go back to the days before the war and are based on principles laid down by the Father of the Republic, Dr. Sun Yat-sen, according to a report prepared for the Twentieth Century Fund.

"The main features of the planned post-war development are a rapid industrialization of China, with emphasis on heavy industries, power plants, chemicals, railway and highway transportation, aviation, and port facilities. Light industries will be of secondary importance. Industrial development will proceed under state guidance and to a large extent under state ownership and direction. The shortage of private industrial capital in China, the absence of a vigorous industrial class, and the large financial problems involved are presumed to necessitate state action and control. The Chinese scientists estimate that the natural resources of China allow for a substantial degree of industrialization."

The National Government of Chiang K'ai-shek plans aid both to private industry and to the industrial cooperatives that have been such a striking development of wartime China. These "vest pocket" industries now number more than 1700 cooperative workshops playing a vital part in supplying both munitions of war and civilian goods to China.

The government is planning a number of reforms in land policy to protect small holders and "thus to create a landowning farming class which would be free from the exactions of a moneylending and officeholding class of landlords."

Summarizing various elements in China's economic system, the report says, "The plans of the National Government envisage what may be called 'a mixed economic system' in which the basic industries will be managed by the state, while the light industries, agriculture and trade will be left to private enterprise and to cooperative associations. This system is often described as state capitalism because of the predominant part which the state will play in operating or controlling the industrial activities of the country.

"The purposes which the post-war economy of China is to serve are strategic and social. In accordance with the principles of Sun Yat-sen, as peace becomes more secure, social aims must be accorded increasing importance. The economic development of the country is to become more and more a means of improving the 'livelihood of the people'."

The Fund's report says China would welcome the cooperation of foreign capital in the post-war development. "The amount of credits that China can use has been estimated in billions of dollars. China hopes that the largest part of such credit may be supplied by the United States, and lesser portions by other 'friendly powers'."

338 Company Reserves Total $742,495,000

• • • In a study covering 551 published reports of companies principally engaged in war production, the Journal of Accountancy has determined that 377 reserves for general or specific purposes amounting to $742,495,000, have been created by 338 companies. (Thirty-nine companies made more than one reserve.) Only limited information was obtained in the survey as to the methods used by these companies in estimating the amounts put into the reserves.

There were 276 reserve provisions amounting to $460,628,000 for 1942, mainly by charges against income, and 101 accumulated reserves at the end of 1942, where no provision was made during that year. The reserves range in description from general contingencies to specific war or post-war purposes, inventories, and to cover investments or foreign assets, according to the survey.

The report notes that there is a question as to the adequacy of these reserves under the present conditions.

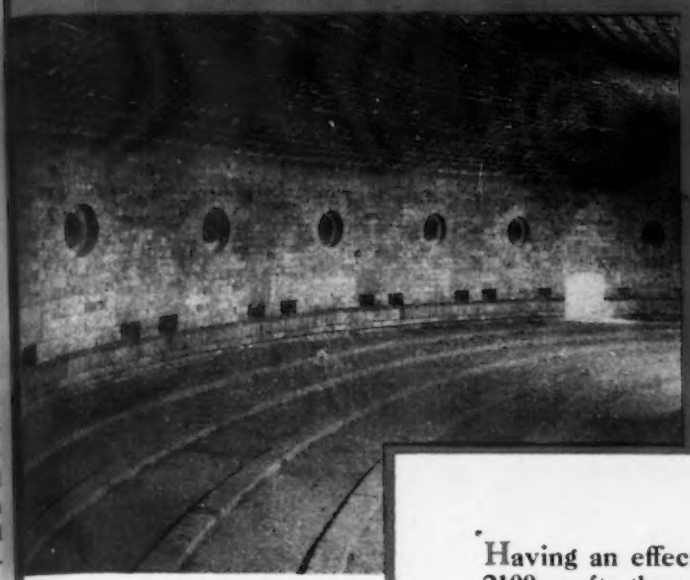
Big Post-War Layoffs Seen by Clyde Gleason

• • • Clyde W. Gleason, occupational technician of the United States Employment Service, predicted recently that 4,000,000 of the present 18,000,000 persons employed in manufacturing plants throughout the nation will be jobless as soon as the war is over.

"The brutal fact is that manufacturing is already far too heavily manned for the earlier stages of post-war production," he said.

His layoff figures he said did not take into account the returning servicement.

THE WORLD'S LARGEST ROTARY FURNACE BUILT BY SALEM



1

The inside surface of the outside wall, showing firing and exhaust ports as well as piers of the rotating hearth on which billets rest.

2

The refractory type baffle between charging and discharging doors protects hot billets being discharged from harmful effects of cold billets being charged.

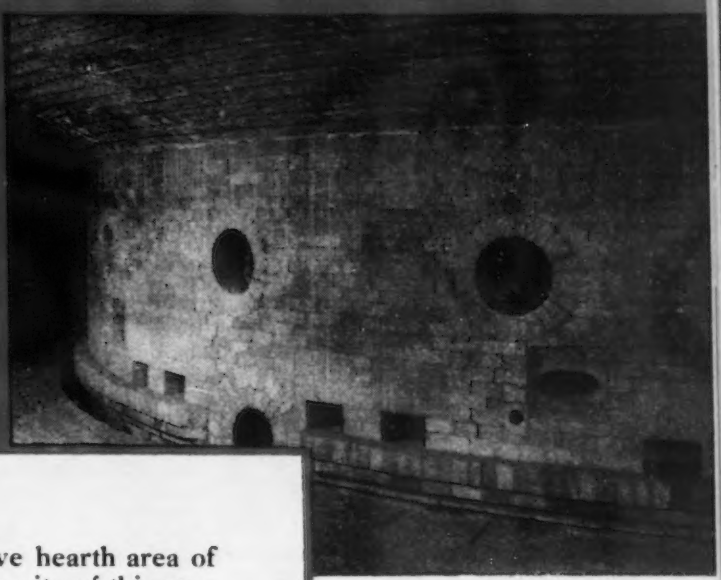
3

A special designed water-cooled pusher charges and discharges billets. The hearth moves continuously or may be operated intermittently, if desired.

Having an effective hearth area of 2100 sq. ft., the capacity of this continuous tunnel type Salem Rotary Billet Heating Furnace is 80,000 lbs. per hour at 2250° F. when heating 10" billets on a 5 hour cycle. It is gas fired, and it is equipped for oil as a stand-by fuel. Billets ranging from 4" to 10" in diameter and from 5' to 14' in length are heated prior to piercing with a maximum scale loss of ½ of 1%. The temperature for each of the five zones in the furnace is automatically recorded and a dial chart, which revolves with the furnace, enables the operator to locate any billet during the heating period.

The hearth is equipped with variable speed mechanism which gives a range of 2 to 8 hours per revolution. A refractory type baffle between charging and discharging doors prevents cold billets, which are being charged, from having a detrimental effect on billets being discharged. For heating certain alloy steels, which require lower charging temperatures and longer heating-up cycles, a removable section of cooling pipes may be placed between the baffle and charging door. Salem will design a similar furnace, or any other type, for your specific needs.

SALEM ENGINEERING COMPANY

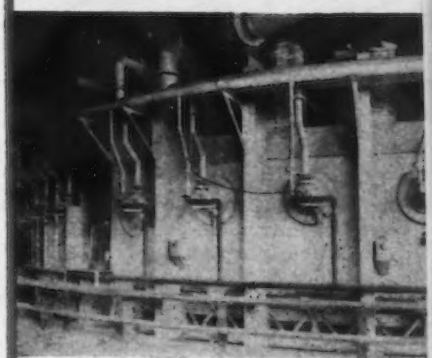


4

Additional ports on the convex surface of the inside wall. Wall to wall width is 16½ ft. Effective loading width of hearth is 14 ft.

5

On the inside of the "doughnut" are located burners which fire through the ports that are shown in Picture No. 4.



6

Burners around the perimeter of the outside wall. Each set of burners is equipped with precise temperature controls.

SALEM ENGINEERING CO. · SALEM, OHIO

Briefly Told—

New Synthetic Rubber; Steel in Surgery, and Other Industry News

• A new synthetic rubber, the sixth major type to be discovered through chemical research, has been developed by the United States Rubber Co., it was announced recently by Herbert E. Smith, president. "Known as Uskol, this new synthetic will be used in both industrial and household products," Mr. Smith said. The new synthetic offers a high degree resistance to solvents, it is said.

•

• Newest unit of Texas' fast growing synthetic rubber industry, the 60,000-ton polymerization plant near Houston, was recently put into operation. Financed by the DPC, the plant will be operated by the Goodyear Tire & Rubber Co., Akron, Ohio.

•

• One year before Hitler invaded Poland, less than 15 per cent of the surgical instruments sold in this country were made in the U. S. A. Now all our surgical instruments are made here, says the American Iron and Steel Institute, pointing out that the American steel industry is producing about 60,000 tons of special steels for some 5000 different applications required by the Army Medical Corps. A single generation of steel metallurgists have: Created new high temperature and corrosion-resistant steels for hospital and laboratory; helped make possible the mass fabrication of these steels into surgical instruments of unparalleled efficiency; materially aided vast life-saving developments within the pharmaceutical industry.

•

• The New Britain, Conn., womanpower drive of last spring to recruit women for war work attracted attention even in foreign lands. W. J. Cashman, director of promotion and publicity at Landers, Frary & Clark, who devised the plan for women recruitment received a letter from K. K. Saraiya of the Metro Engineering & Cine Service of Bombay, India, stating he read of the campaign and would like to obtain more details.

•

• *Now being installed as standard equipment on at least one type of U. S. war plane is a new device called the Temp-Turb which automatically controls the temperature of flowing air in ducts, it was announced by General Electric Co.'s appliance & merchandise department. In current production, Havoc A 20 attack bombers are being equipped with the Temp-Turb for regulating temperatures in cabin warming and windshield defrosting. According to G-E engineers, automatic control of the temperature of flowing ducted air provided by Temp-Turb can also be used to advantage in wing de-icing equipment, and carburetor air intake for planes.*

• The New Haven Railroad has been granted court permission to purchase 50 steel cabooses at $320,000 or $6,400 each.

•

• Orders totaling $384,307,433 were received by 4,913 Michigan firms from General Motors in 1942, according to an analysis of the corporation's purchasing records. This was an increase of 86 per cent over the figure for 1939, last normal year of peacetime business.

•

• Conversion in less than a week of one of the Pullman-Standard Car Mfg. Co. plants at Hammond, Ind., from the production of tanks to heavy artillery carriages was reported recently by Wallace N. Barker, vice president.

•

• *Curtiss-Wright Corp.'s airport plant in Buffalo is recruiting overtime volunteers from its regular employees to speed output of C-46 Commandos. Hundreds of employees have responded to the plea to put in three overtime tricks of four hours each week.*

•

• Reflecting the important part electronics is playing in the war, the Westinghouse Lamp Division at Bloomfield, N. J., recently reported its production of electronic tubes is 11 times as great as it was two years ago. Total sales of Westinghouse electronic tubes this year will exceed $22,000,000 as compared with $1,872,000 in 1941, it is estimated.

•

• Propulsion machinery for nearly 1,000,000 tons of ocean shipping—enough to land and continuously supply two divisions of modern fighting men—was delivered from the new Westinghouse Merchant Marine plant in Philadelphia, in the year ending this October, Ellis L. Spray, manager, reported.

•

• Study of postwar aviation problems especially affecting the manufacture and operation of aircraft in business and other personal uses, as distinct from planes for military and scheduled commercial use, has been inaugurated by the recently organized Personal Aircraft Committee of the Aeronautical Chamber of Commerce, it was announced recently by Joseph T. Geuting, Jr., chairman.

•

• Over five carloads of double-size headaches for the enemy in the form of new-type fragmentation bomb casings are rolling daily from plants of the American Steel & Wire Co., Cleveland. The new casing can best be described as a spring with no pitch. Heavy steel rod is drawn to a trapezoidal shape and is then wound in the cold state into large springs with no clearance between the coils. Produced in two sizes, the new casings were adopted because of the readiness with which they break into countless small pieces upon explosion of the charge.

•

• *Declaring the war would not be over by Christmas or Spring, Mrs. Anna M. Rosenberg, New York regional War Manpower Commission director, told a CIO convention in Buffalo that unless 400,000 able-bodied men and women in New York state switched to war jobs from non-essential industries during the next six months war production would be "seriously retarded."*

•

• During September, Canada's external trade, excluding gold, showed total value of $384,639,552 compared with $444,240,536 in Aug. and $333,858,851 in Sept., 1942, according to a report by the Dominion Bureau of Statistics. During the first nine months this year the total external trade was $3,414,075,016 against $2,932,572,404 in the same period of 1942. The nine months' total this year exceeded by about $16,000,000 the total external trade for the full year 1941.

•

• Statistics compiled by the Department of Labor show the average weekly wage in 2086 Massachusetts manufacturing concerns was $43.41 during Sept., an increase of 94c., as compared with Aug. The figures show that 534,607 were employed in the 2086 plants, a decrease from Aug. of 2306. Of these workers, 352,566, or 65.9 per cent were engaged in war production.

•

• Antithetical to "absenteeism" is the record of James R. Rose, a steelworker at Carnegie-Illinois Steel Corp. Homestead, Pa., Works, who at the age of 57 has established a term of 40 years' service without being absent or late. His father, Harry F. Rose, was also a homestead veteran, with 43 years of service before retiring in 1925.

•

• *Edward J. Stone, manufacturing engineer at the East Springfield, Mass., Westinghouse Electric & Mfg. Co. plant, recently addressed the Worcester chapter of the American Society of Tool Engineers*

COMING EVENTS

Nov. 17, 18—National Founders Association, New York.
Nov. 17, 18—Galvanizers' Committee, Pittsburgh.
Nov. 19—Steel Products Warehouse Association, Inc., Chicago.
Nov. 29 to Dec. 3—American Society of Mechanical Engineers, New York.
Dec. 6 to 11—19th Exposition of Chemical Industries, New York.
Dec. 8, 9, 10—National Association of Manufacturers, New York.
Jan. 10 to 14, 1944—Society of Automotive Engineers, Detroit.
April 2 to 5—The American Ceramic Society, Inc., Pittsburgh.
April 12 to 15—The Electrochemical Society, Inc., Milwaukee.

BOTTLENECKS

DAMN THE TORPEDOES

FULL SPEED AHEAD!

Making only Mounted Wheels and small Grinding Wheels—maintaining highest quality in spite of large quantities and rush orders—shipping them promptly. ***This is our job, our battlefield.***

With full WPB approval, we stopped making all large size grinding wheels and fixed our sights on wheels *3″ in diameter and under.*

We worked all around the clock, 24 hours a day, and in a short time were able to fill orders on time—And, our central location cuts time in transit. Today, there is no waiting. With the Army-Navy E at our masthead, we are going full speed ahead.

AMERICA'S HEADQUARTERS FOR

MOUNTED WHEELS

SMALL GRINDING WHEELS

Half a century of specialization has established our reputation as the Small Wheel People of the Abrasive Industry. You can bank on us.

TEST WHEEL FREE—To get acquainted with Chicago Wheels, let us send one postpaid. Tell us size wheel and material you wish to grind.

Write for illustrated catalog

ARMY E NAVY

CHICAGO WHEEL & MFG. CO.

1101 W. Monroe St., Dept. RA, Chicago 7, Illinois

RA-11

Send Catalog. Interested in:

☐ Mounted Wheels ☐ Grinding Wheels ☐ Send Test Wheel. Size_____

Name_____

Address_____

on chromium plating of worn tools and dies. He said the plating method has been so successful that tools and gages have been reclaimed from the scrap pile and put back into useful work. He also stated that chrome-plated tools outlast unplated ones by as much as 20 to 1.

•

• More than 850,000 lb. of tin have been saved by the General Electric Co. in the 23 months since Pearl Harbor as a result of changes adopted by the company in its solders and babbitt alloys.

•

• *Frank C. Copp and Arthur S. Morse of the Lynd-Farquhar Co.; Paul E. Williams and Albert Wigglesworth of the Wigglesworth Machine Co.; Arthur B. Kettle of the Austin Hastings Co.; John P. Tierney of the General Machine Co., and Stanley W. Steadfast of the Steadfast-Roulston Co. last week were presented plaques by Brig.-Gen. Burton O. Lewis, commanding general of the Boston Ordnance District.*

•

• Production of the Elastic Stop Nut Corp. of America for a single month, well in the hundreds of millions of units, is almost double the monthly production six months previous and triple the rate for the same month a year ago, according to William T. Hedlund, president.

•

• Deliveries of war materials by General Motors in the third quarter of 1943 increased 11.4 per cent over the second quarter, from $832,275,349 to $927,479,569, and for the first nine months of this year war material product deliveries amounted to $2,525,280,753, or 2.1 times the volume for the first nine months of 1942, the company said Oct. 30.

•

• *Lifting of restrictions on its Vulcalock cement, so that anyone who can qualify under Rubber Restriction Order R-1 can purchase and use the product has been announced by The B. F. Goodrich Co.*

•

• After an absence of nearly a century, the frigate is on its way back to service in the United States Navy—and on pontoons at that, the U. S. Maritime Commission revealed. The Commission announced the beginning of deliveries of 102 of these 306-ft. fighting ships, an adaptation of the gunboat or corvette, which are being built or will be built for the American and British Navies. The frigates must be taken down to the Gulf of Mexico in spite of shallow stretches of the Mississippi River. They have to be towed on pontoons.

•

• General Electric Co. has announced a "reservation" plan for post-war radio broadcasting equipment, whereby buyers may deposit War Bonds to cover the proposed purchases.

•

• *Joseph B. Eastman, director of the ODT, told the representatives of major shipper and carrier organizations recently that the next six months probably would prove the most critical of the war for transportation and urged that actions be taken at once to step up the utilization of existing rail equipment by at least 10 per cent. A War Transportation Efficiency Committee recently set up will concentrate on a program to speed up the loading, unloading and cleaning of cars, reduce switching time and speed up freight movements generally.*

•

• Exploratory work by the Bureau of Mines has revealed more than 200,000 tons of copper-cobalt-gold ores in the Blackbird District of Lemhi County, Idaho.

•

• Lieut. Col. Arthur G. Tague has been placed in command of two big supply depots being operated by the Army Air Service Command in the Buffalo area. Administrative setup of the two depots has been consolidated to "streamline and speed up operations."

•

• Before the Interstate Commerce Commission that is investigating river-rail freight rates on coal into the Youngstown area, William E. Fowler, general traffic manager of Youngstown Sheet & Tube Co., charged that the railroads serving Youngstown are squeezing steel plants with exorbitant rates. He stated that the hauling of western Pennsylvania coal by barge from the mines to Conway and Colona and then transshipping it by rail to Youngstown resulted in rail charges twice as much as that for hauling the coal in competing districts even where conditions are not as favorable to the railroads. He described in detail the 50-year fight for a Lake Erie-Ohio river canal and also pointed out that the Pittsburgh, Lisbon & Western Railroad in 1927 sought to open a line and establish a 60-cent coal rate. This was not permitted by ICC.

•

• The explosive and inflammable characteristics of some of the metal powders now widely used in American wartime plants have been determined by Bureau of Mines research workers. Zirconium, magnesium and magnesium alloys, aluminum, and titanium powders are described as "the most inflammable" of the 53 metal powder samples from 14 different metals and two alloys studied by Bureau scientists in recent months. In the category of "moderate inflammability" are pure iron, manganese, zinc, silicon, tin and antimony, while metal powders of "low inflammability" are lead, cadmium, milled iron, copper, and chromium.

31 New Records Set By Carnegie-Illinois

• • • During October, men and women steelmakers of the Carnegie-Illinois Steel Corp. set 31 new monthly production records, including a record for monthly production of steel ingots. In October, this U. S. Steel subsidiary's production was 2,330,933 net tons of ingots and castings. Blast furnaces at Clairton, Carrie Furnaces at Homestead steel works, and South (Chicago) Works set new records for the monthly production of pig iron. Open hearth furnace production records were shattered for both the Pittsburgh and Chicago Districts. Rolling mill units at Homestead steel works reported new monthly records for the 30 and 32 in. slabbing mills and the 100 in. semi - continuous plate - mill. Crews on the 30 in. slabbing mill operate at better than 190 per cent of normal capacity to beat a record that had stood for 14 years. Johnstown-Lorain Works' October production of mine and industrial cars established a new record.

MAN AND "MARS": A 200 lb. Chief Petty Officer stands at the wingtip of the giant Martin "Mars" flying boat to show how the huge wing spread and fuselage dwarfs him.

WARTIME LESSONS in Aluminum Castings

According to WPB figures, the average American-built war plane contains seven and one-half tons of aluminum; some of the larger bombers carry more than double that weight of aluminum parts. Aluminum castings are an important part of this tonnage. It has been our privilege to produce a part of this tremendous volume of aluminum castings for planes and other armaments. Some of these castings go far beyond pre-war limitations in size — others are of extremely intricate shape and coring. Plane and engine builders have learned that there is no aluminum casting job too large, too small or too complex for Howard Foundry. Deliveries are made on schedule—or sooner.

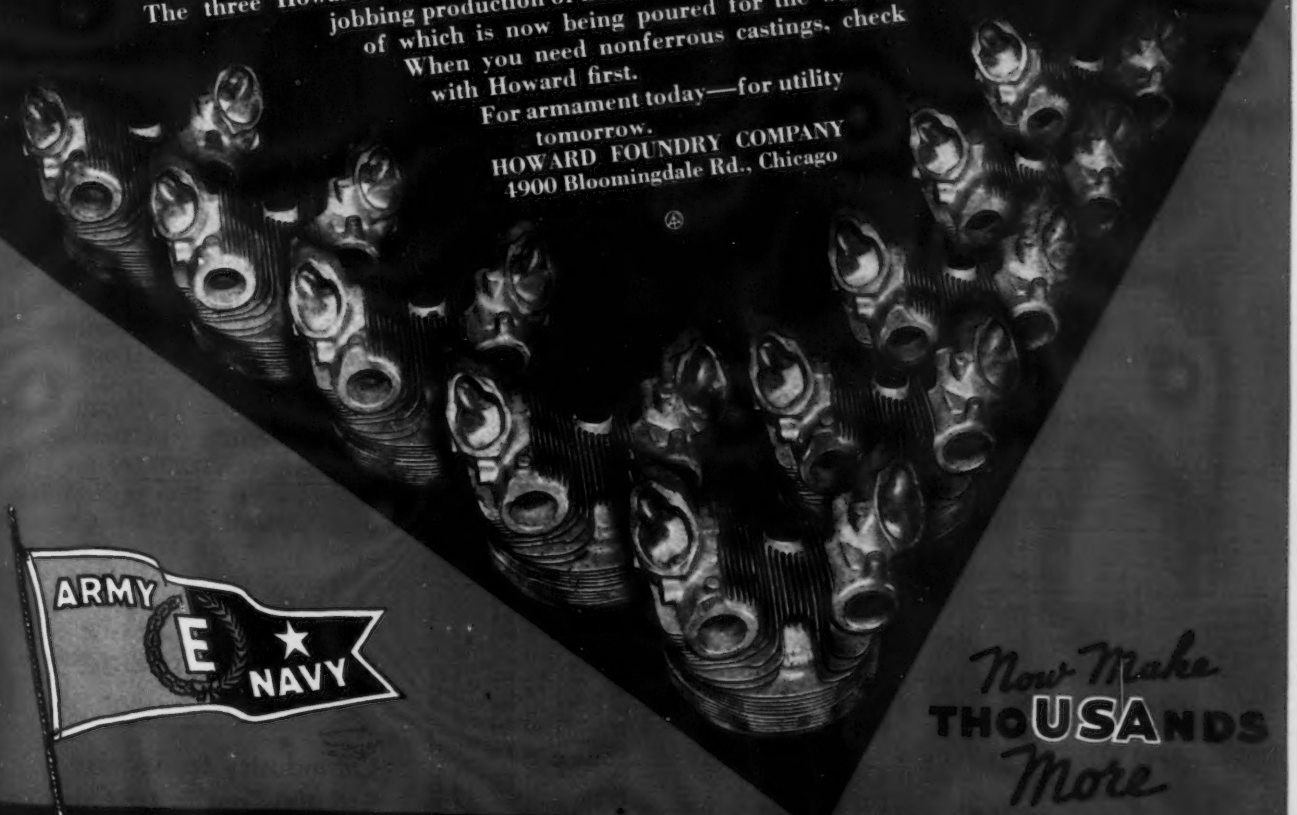
Current accomplishments in aluminum castings indicate more extensive peace-time applications. In aircraft this is definitely assured. To mention another field—trucks and buses—weight savings of great value will be secured by the broader use of aluminum cast parts in the designs of tomorrow and we hope to figure prominently in these revolutionary improvements, which will embrace a wide range of products.

The three Howard foundries—aluminum, magnesium, bronze—embody the largest jobbing production of nonferrous castings in America; all of which is now being poured for the war effort.

When you need nonferrous castings, check with Howard first.

For armament today—for utility tomorrow.

HOWARD FOUNDRY COMPANY
1900 Bloomingdale Rd., Chicago



ARMY E NAVY

Now Make THOUSANDS More

HOWARD

ALUMINUM · BRASS · BRONZE · MAGNESIUM CASTINGS

Sykes Condemns Mine Wage Terms

Chicago

• • • **Secretary of the Interior** Harold L. Ickes' coal mine wage agreement with John L. Lewis is not in harmony with the national wage stabilization policy nor with the decision of the War Labor Board as far as its provisions apply to the Inland Steel Co.'s mine at Wheelwright, Ky., Wilfred Sykes, Inland president and operating manager of the mine informed Ickes in a telegram last Wednesday.

Ickes' contract with Lewis, approved by the War Labor Board on Nov. 5, in effect pays mine workers $1.50 for an extra full hour of work each day. It establishes a work day of 8 hr. and 45 min. with an intermission of 15 min. for lunch which is not paid for, making a 9-hr. day overall.

Sykes told Ickes that Inland will comply with the new arrangement but pointed out that instead of an extra full hour's work that might be expected, the Wheelwright mine will receive only eleven minutes of additional productive work for the added $1.50 per day.

Acknowledging a telegram from Ickes on the new mine contract, Sykes stated:

"Your telegram establishes a work day of 8 hr. and 45 min. on a portal to portal basis, making 9 hr. including lunch time. At the Inland Steel Co.'s mine average travel time is about 47 min. at each end of the day. You will thus require us to increase wages by $1.50 per day for which we will receive only about 11 min. of additional productive work. This does not seem to be in harmony with the national wage stabilization policy nor with the decision of the War Labor Board."

Sykes called attention to the fact that in announcing the decision of the War Labor Board, Chairman William H. Davis said that the agreement made by the Secretary of the Interior with the union was within the limits of the national wage stabilization policy "because the increased daily earnings will then all be in payment for increased production of coal."

The Inland president commented that "that statement will not be true at our mine under the instructions which you have issued."

Ingot Output in October Highest on Record

YEAR 1943

Production of Open Hearth, Bessemer and Electric Steel Ingots, and Steel for Castings. Source: American Iron & Steel Institute

Based on Reports by Companies which in 1942 made 98.3% of the Open Hearth, 100% of the Bessemer and 87.6% of the Electric Ingot and Steel for Castings Production

Period	Estimated production—all companies: Open Hearth Net tons	Open Hearth Percent of capacity	Bessemer Net tons	Bessemer Percent of capacity	Electric Net tons	Electric Percent of capacity	Total Net tons	Total Percent of capacity	Calculated weekly production all companies (Net tons)	Number of weeks in month
January	6,576,589	97.8	478,058	85.9	369,395	95.4	7,424,042	96.8	1,675,856	4.43
February	6,033,674	99.3	447,843	89.1	344,532	98.6	6,826,049	98.5	1,706,512	4.00
March	6,785,295	100.9	503,673	90.5	381,219	98.5	7,670,187	100.0	1,731,419	4.43
1st Quarter	19,395,558	99.3	1,429,574	88.4	1,095,146	97.5	21,920,278	98.4	1,704,532	12.86
April	6,509,812	99.9	481,810	89.4	382,532	102.1	7,374,154	99.3	1,718,917	4.29
May	6,664,298	99.1	483,024	86.8	398,057	102.9	7,545,379	98.4	1,703,246	4.43
June	6,188,857	95.0	453,599	84.1	384,645	102.6	7,027,101	94.6	1,638,019	4.29
2nd Quarter	19,362,967	98.0	1,418,433	86.7	1,165,234	102.5	21,946,634	97.4	1,686,905	13.01
1st 6 months	38,758,525	98.7	2,848,007	87.6	2,260,380	100.0	43,866,912	97.9	1,695,667	25.87
July	6,516,387	96.2	466,288	90.6	393,342	94.0	7,376,017	95.7	1,668,782	4.42
August	6,669,944	98.3	484,957	94.0	407,224	97.1	7,562,125	97.9	1,707,026	4.43
September	6,617,102	100.9	480,635	96.4	391,241	96.6	7,488,978	100.4	1,749,761	4.28
3rd Quarter	19,803,433	98.5	1,431,880	93.6	1,191,807	95.9	22,427,120	98.0	1,708,082	13.13
9 months	58,561,958	98.6	4,279,887	89.5	3,452,187	98.5	66,294,032	97.9	1,699,847	39.00
October	6,859,051	101.1	513,521	99.5	413,787	98.7	7,786,359	100.8	1,757,643	4.43

Note—The percentages of capacity operated are calculated on weekly capacities of 1,518,621 net tons open hearth, 125,681 net tons Bessemer and 87,360 net tons electric ingots and steel for castings, total 1,731,662 net tons; based on annual capacities as of January 1, 1943 as follows: Open hearth 79,180,880 net tons, Bessemer 6,553,000 net tons, electric 4,554,980 net tons. Beginning July 1, 1943, the percentages of capacity operated are calculated on weekly capacities of 1,531,789 net tons open hearth, 116, 494 net tons Bessemer and 94,667 net tons electric ingots and steel for castings, total 1,742,950 net tons: based on annual capacities as follows: Open hearth 79,867,450 net tons, Bessemer 6,074,000 net tons., Electric 4,935,960 net tons.

YEAR 1942

Period	Estimated production—all companies: Open Hearth Net tons	Open Hearth Percent of capacity	Bessemer Net tons	Bessemer Percent of capacity	Electric Net tons	Electric Percent of capacity	Total Net tons	Total Percent of capacity	Calculated weekly production all companies (Net tons)	Number of weeks in month
January	6,322,215	95.3	490,874	86.0	299,017	94.2	7,112,106	94.5	1,605,442	4.43
February	5,785,918	96.6	453,549	88.0	273,068	95.2	6,512,535	95.9	1,628,134	4.00
March	6,572,930	99.0	493,191	86.4	325,990	102.7	7,392,111	98.2	1,668,648	4.43
1st Quarter	18,681,063	97.0	1,437,614	86.7	898,075	97.4	21,016,752	96.2	1,634,273	12.86
April	6,345,133	98.7	454,834	82.2	321,324	104.5	7,121,291	97.7	1,659,975	4.29
May	6,595,440	99.4	453,938	79.5	333,200	104.9	7,382,578	98.1	1,666,496	4.43
June	6,239,674	97.1	452,528	81.8	323,100	105.1	7,015,302	96.3	1,635,269	4.29
2nd Quarter	19,180,247	98.4	1,361,300	81.2	977,624	104.8	21,519,171	97.4	1,654,049	13.01
1st 6 months	37,861,310	97.7	2,798,914	83.9	1,875,699	101.1	42,535,923	96.8	1,644,218	25.87
July	6,345,315	95.7	453,686	79.6	345,957	96.6	7,144,958	94.5	1,616,506	4.42
August	6,414,637	96.5	467,293	81.8	345,725	96.3	7,227,655	95.4	1,631,525	4.43
September	6,286,855	97.9	437,961	79.4	332,703	95.9	7,057,519	95.4	1,648,953	4.28
3rd Quarter	19,046,807	96.7	1,358,940	80.3	1,024,385	96.3	21,430,132	95.4	1,632,150	13.13
9 months	56,908,117	97.3	4,157,854	82.7	2,900,084	99.4	63,966,055	96.3	1,640,155	39.00
October	6,750,829	101.5	461,897	80.9	366,788	102.2	7,579,514	100.0	1,710,951	4.43
November	6,371,750	99.0	458,469	82.9	349,593	100.5	7,179,812	97.8	1,673,616	4.29
December	6,471,261	97.6	475,204	83.4	358,075	100.0	7,304,540	96.6	1,652,611	4.42
4th Quarter	19,593,840	99.4	1,395,570	82.4	1,074,456	100 9	22,063,866	98.2	1,679,137	13.14
2nd 6 months	38,640,647	98.0	2,754,510	81.3	2,098,841	98.6	43,493,998	96.8	1,655,653	26.27
Total	76,501,957	97.9	5,553,424	82.6	3,974,540	99.8	86,029,921	96.8	1,649,979	52.14

Note—The percentages of capacity operated in the first 6 months are calculated on weekly capacities of 1,498,022 net tons open hearth, 128,911 net tons Bessemer and 71,682 net tons electric ingots and steel for castings, total 1,698,622 net tons; based on annual capacities as of Jan. 1, 1942, as follows: Open hearth 78,107,260 net tons, Bessemer 6,721,400 net tons, electric 3,737,510 net tons. Beginning July 1, 1942, the percentages of capacity operated are calculated on weekly capacities of 1,500,714 net tons open hearth, 128,911 net tons Bessemer and 81,049 net tons electric ingots and steel for castings, total 1,710,674 net tons; based on annual capacitues as follows: Open hearth 78,247,230 net tons, Bessemer 6,721,400 net tons, Electric 4,225,890 net tons.

U. S. Steel Shipments At New Monthly High Mark

• • • **Shipments of** finished steel products by subsidiary companies of United States Steel Corp. for the month of October were 1,794,968 net tons, an increase of 130,391 net tons over September. In October, 1942, shipments were 1,787,501 net tons.

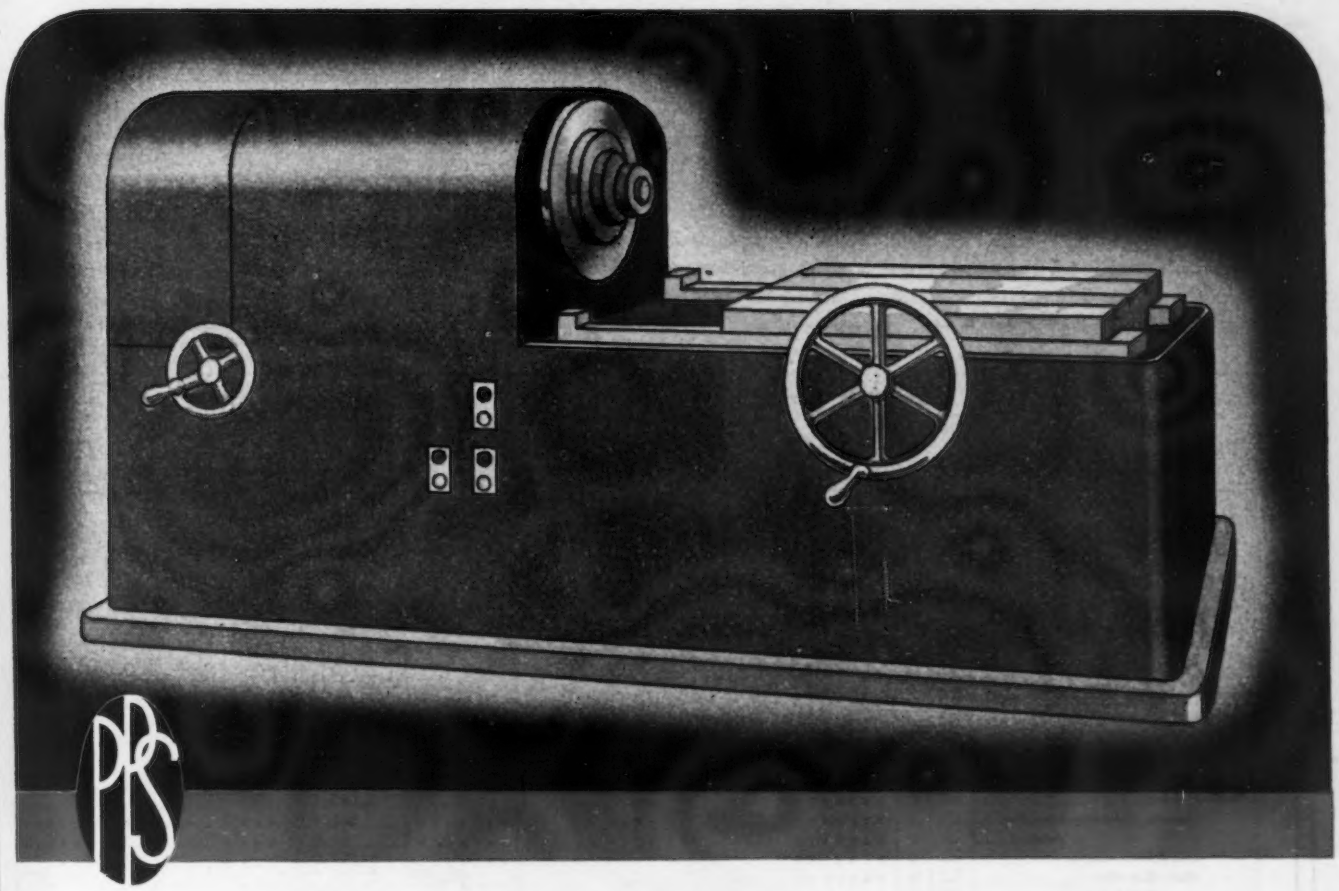
For the year 1943 to Nov. 1, shipments were 16,864,612 net tons compared with 17,548,977 net tons in the comparable period of 1942, a decrease of 684,365 net tons.

October was the highest month since December, 1942, when 1,849,635 net tons were shipped.

Oil Industry to Receive 518,000 Tons in 1st Quarter

Chicago

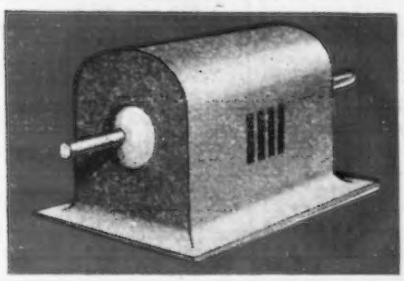
• • • **Although** less carbon steel will be allotted to the petroleum industry for the first quarter of 1944 than in the third and fourth quarters of 1943 because of smaller pipeline and refinery construction requirements, chances are good that the industry will be able to squeeze by, Frank A. Watts, director of materials, Petro-



PARTS FOR FACTORY EQUIPMENT & MACHINERY

Advances in engineering and design and improved materials will make "The work shop of the world" a new vision of utilitarian beauty.

Pressed Metal Parts and stampings will be used for factory equipment and machinery in the future, just as they have been in the past, but to an accelerated degree. They will make possible revolutionary advances, due to their ability to stand up to abuse, resistance to shock, rugged strength, ability to withstand corrosive conditions, survive radical temperature changes, not to mention low cost and a score of other characteristics, providing requirements not met by any other material.



Sound safe designs literally demand fullest possible use of stampings. Call on the Parish Pressed Steel Company for engineering cooperation. Our services will be found helpful.

★ METAL STAMPINGS ★ MODERN DESIGN AT LOW COST ★

PARISH PRESSED STEEL CO. *Subsidiary of* **SPICER MFG. CORP.**

READING, PA.

Western Representative: F. Somers Peterson, 57 California St., San Francisco, Cal.

leum Administration for War, reported to the Petroleum Industry War Council committee on production here last week.

Present indications are that during the first quarter of 1944 demands for steel will exceed all supplies by approximately 25 per cent, he said, taking into account all claimant agencies.

It was estimated that a total of 430,000 tons of carbon steel and 88,000 tons of alloy steel would be allotted to the Petroleum Administration for War during the first quarter of 1944. Of the first quarter allotments, 253,000 tons of carbon steel will be available, it is hoped, for casing, tubing, drill pipe and line pipe, and 52,000 alloy steel for casing, tubing and drill pipe. Approximately 70 per cent of the industry's first quarter controlled material requirements will be tubular items, it was prophesied. It was estimated that 5400 wildcat and development wells would be drilled next quarter.

Watts stated that stocks of shelf items required for production now held by more than 300 oil field supply companies are critically low, but are being slowly rebuilt and should be adequate to sustain operations.

September Steel Shipments 5,655,610 Net Tons

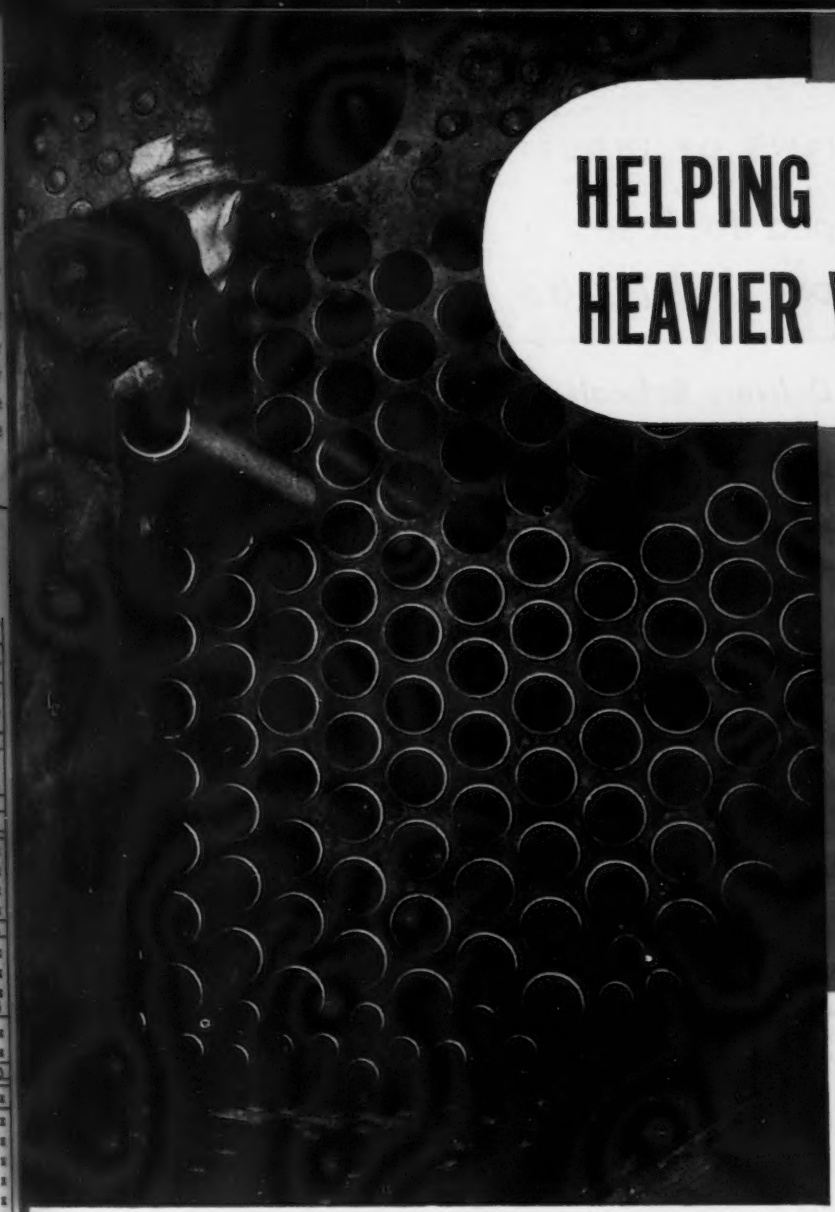
Source: American Iron and Steel Institute

		Number of companies reporting	Line	Annual Capacity Net tons	Production for Sale—Net Tons: Current Month: Total	Current Month: Per cent of capacity	Current Month: Shipments: Export *	Current Month: Shipments: To members of the industry for conversion into further finished products	Year to Date: Total	Year to Date: Per Cent of capacity	Year to Date: Shipments: Export *	Year to Date: Shipments: To members of the industry for conversion into further finished products
Steel Products	Ingots, blooms, billets, slabs, sheet bars, etc.	44	1	xxxxxxx	710,165	xxx		200,958	6,132,648	xxx		1,807,602
	Heavy structural shapes	10	2	5,412,580	321,495	72.3		xxxxxxx	2,830,473	69.9		xxxxxxx
	Steel piling	4	3	338,000	3,677	13.3		xxxxxxx	27,334	10.8		xxxxxxx
	Plates—Sheared and Universal	21	4	9,189,740	1,074,646	142.4		3,052	9,561,493	139.1		29,069
	Skelp	7	5	xxxxxxx	57,146	xxx		33,703	596,869	xxx		355,725
	Rails—Standard (over 60 lbs.)	4	6	3,629,260	185,941	62.4		xxxxxxx	1,386,289	51.1		xxxxxxx
	Light (60 lbs. and under)	6	7	309,690	14,224	55.9		xxxxxxx	129,717	56.0		xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	102,000	1,333	15.9		xxxxxxx	17,989	23.6		xxxxxxx
	Splice bar and tie plates	13	9	1,120,270	47,541	51.7		xxxxxxx	463,743	55.3		xxxxxxx
	Bars—Merchant	40	10	xxxxxxx	599,169	xxx		86,573	5,328,155	xxx		716,765
	Concrete reinforcing—New billet	15	11	xxxxxxx	33,653	xxx		xxxxxxx	321,383	xxx		xxxxxxx
	Rerolling	16	12	xxxxxxx	4,846	xxx		xxxxxxx	62,609	xxx		xxxxxxx
	Cold finished—Carbon	23	13	xxxxxxx	146,896	xxx		xxxxxxx	1,317,657	xxx		xxxxxxx
	Alloy—Hot rolled	20	14	xxxxxxx	257,736	xxx		28,997	2,301,746	xxx		325,325
	Cold finished	19	15	xxxxxxx	33,645	xxx		xxxxxxx	350,608	xxx		xxxxxxx
	Hoops and baling bands	5	16	xxxxxxx	4,973	xxx		xxxxxxx	70,303	xxx		xxxxxxx
	TOTAL BARS	63	17	14,719,525	1,080,918	89.4		114,570	9,752,461	88.6		1,040,090
	Tool steel bars (rolled and forged)	17	18	200,840	12,998	78.8		xxxxxxx	141,027	93.9		xxxxxxx
	Pipe and tube—B. W.	15	19	2,231,040	110,429	60.3		xxxxxxx	991,218	59.4		xxxxxxx
	L. W.	8	20	845,400	47,183	68.0		xxxxxxx	421,380	66.6		xxxxxxx
	Electric weld	8	21	1,149,250	85,739	90.9		xxxxxxx	775,220	90.2		xxxxxxx
	Seamless	15	22	3,082,400	195,259	77.2		xxxxxxx	1,628,714	70.6		xxxxxxx
	Conduit	7	23	190,000	4,516	29.0		xxxxxxx	43,808	30.8		xxxxxxx
	Mechanical Tubing	11	24	597,800	65,069	132.6		xxxxxxx	560,544	125.4		xxxxxxx
	Wire rods	22	25	xxxxxxx	107,530	xxx		16,089	897,345	xxx		171,801
	Wire—Drawn	41	26	2,356,550	172,942	89.4		2,325	1,487,080	84.4		42,488
	Nails and staples	19	27	1,116,640	64,013	69.8		xxxxxxx	616,521	73.8		xxxxxxx
	Barbed and twisted	15	28	482,280	20,885	52.7		xxxxxxx	182,890	50.7		xxxxxxx
	Woven wire fence	16	29	778,060	27,222	42.6		xxxxxxx	181,523	31.2		xxxxxxx
	Bale ties	12	30	128,420	9,603	91.1		xxxxxxx	84,938	88.4		xxxxxxx
	All other wire products	8	31	78,220	4,565	71.1		xxxxxxx	44,649	76.3		xxxxxxx
	Fence posts	11	32	112,065	5,867	63.8		xxxxxxx	30,630	36.5		xxxxxxx
	Black plate	10	33	339,700	34,490	123.7		-	240,494	94.6		-
	Tin plate—Hot rolled	4	34	483,620	-	-		xxxxxxx	10,597	2.9		xxxxxxx
	Cold reduced	10	35	3,841,340	190,275	60.3		xxxxxxx	1,679,465	58.5		xxxxxxx
	Sheets—Hot rolled	37	36	xxxxxxx	465,821	xxx		15,229	4,431,817	xxx		152,230
	Galvanized	14	37	xxxxxxx	73,508	xxx		xxxxxxx	607,523	xxx		xxxxxxx
	Cold rolled	14	38	xxxxxxx	127,111	xxx		xxxxxxx	1,104,056	xxx		xxxxxxx
	All other	16	39	xxxxxxx	30,634	xxx		xxxxxxx	269,784	xxx		xxxxxxx
	TOTAL SHEETS	28	40	13,497,570	697,074	62.9		15,229	6,413,180	63.5		152,230
	Strip—Hot rolled	22	41	3,201,690	132,486	50.4		19,503	1,148,791	48.0		141,438
	Cold rolled	39	42	2,059,740	109,903	65.0		xxxxxxx	878,361	57.0		xxxxxxx
	Wheels (car, rolled steel)	5	43	424,820	21,025	60.3		xxxxxxx	168,725	53.1		xxxxxxx
	Axles	6	44	453,470	13,980	37.6		xxxxxxx	120,178	35.4		xxxxxxx
	Track spikes	11	45	308,350	9,919	39.2		xxxxxxx	105,492	45.7		xxxxxxx
	All other	5	46	xxxxxxx	15,552	xxx		xxxxxxx	147,117	xxx		xxxxxxx
	TOTAL STEEL PRODUCTS	159	47	xxxxxxx	5,655,610	xxx		405,429	49,898,903	xxx		3,740,441
	Pig iron, ferro manganese and spiegel	26	48	xxxxxxx	764,138	xxx		364,195	6,840,203	xxx		3,449,339
	Ingot moulds	5	49	xxxxxxx	88,016	xxx		xxxxxxx	736,971	xxx		xxxxxxx
Iron Products	Bars	10	50	170,110	9,189	65.1		569	74,230	58.3		2,661
	Pipe and tubes	2	51	106,000	6,369	73.2		xxxxxxx	65,233	82.3		xxxxxxx
	All other	1	52	56,000	898	19.5		-	10,561	25.2		-
	TOTAL IRON PRODUCTS (ITEMS 50 to 52)	11	53	xxxxxxx	16,456	xxx		569	150,024	xxx		2,661

Total number of companies included, 183.

During 1942, the companies included above represented 98.8% of the total output of finished rolled products.

* In accordance with Government policy, export figures cannot be published.



HELPING RAILROADS MOVE HEAVIER WARTIME LOADS..

Talon's Electric Welded Steel Tubing . . . . .

SIZES FROM 5/8" O.D. TO 4" O.D. UP TO 40' IN LENGTH

This illustration shows Talon's Electric Welded Steel Tubing being used in boiler construction by the Lima Locomotive Works for the Central of Georgia Railway.

Talon's Electric Welded Steel Tubing has characteristics which are particularly well suited to locomotive boilers. It withstands the terrific high pressure and structural strain which locomotives are undergoing to haul heavier wartime loads more rapidly. Cold-formed from flat-rolled steel, Talon's tubing is concentric and uniformly accurate to size for easy installation. Proper normalizing provides maximum ductility for expanding and beading, and increases physical properties.

There are no thin, weak spots in the wall of Talon's Electric Welded Steel Tubing . . . accurate gauge of the steel determines uniform wall thickness. No extra metal is added in welding . . . grain structure of wall and weld is homogeneous. Hydrostatic testing of every foot of Talon's Pressure Tubing is your assurance that the weld and adjacent area are as strong as the wall. Sizes from 5/8" to 4" O.D. are available in lengths up to 40 feet.

PRESSURE **MECHANICAL**

TALON . . INC.

STEEL TUBE DIVISION **OIL CITY, PENNA.**

Inventory Reports Dropped to Ease Paper Work for Operators Under L-63

Washington

• • • **WPB last Friday** eliminated the filing of Form WPB-825 (formerly PD-336) for suppliers and distributers who operate under the terms of Order L-63.

However, suppliers are now asked to keep their own records of total net monthly sales from stock and total inventory of supplies at the end of each month, but they need not keep a separate record of each type of supplies.

Although this may indicate that WPB is voluntarily cutting down its paper work requirements this is not actually the case. The Office of Survey Standards, which works jointly with Bureau of the Budget officials, declined to approve a revision of WPB-825 on the ground that L-63 requires merely that sales and inventory figures be kept available for inspection and does not compel the filing of a report.

Allowing suppliers to maintain their own records will be beneficial to the larger members of the industry, but it has been pointed out to WPB that a retention of the form, with some modifications, might benefit the smaller distributer. Smaller distributers maintained that they do not possess complete recording systems in all cases, and existing accounting systems in smaller offices may vary greatly.

Another change clarified the meaning of the fourth exemption from the order by substituting the phrase "replacement parts specially designed to fit only one model and brand of machinery or equipment and adaptable to no other use" for the phrase "functional replacement parts for machinery and equipment."

Delivery Refusals Puzzle to Steelmakers

• • • Last week WPB issued Interpretation 4 to Order L-219 permitting merchants to refuse delivery of merchandise which would increase their inventory above the limits set forth in the order.

Steelmakers worried whether this could be construed to give consumers of controlled materials the same right, governed by the 60-day inventory limitation.

One unofficial interpretation in Washington of CMP Reg. 2 states that steel consumers might be protected similarly depending on the varying interpretations of courts in different jurisdictions.

WPB in New York flatly states that Order L-219 is strictly a retail merchants order and that its regulations have nothing whatever to do with controlled materials. Until a similar permission is granted through amendment to the CMP regulations steelmakers were told not to worry.

Zinc Use Limitations Eased

Washington

• • • **WPB has issued** an amended Order M-11-þ, adding to the list of uses in which zinc may be used. Added uses are: (1) applying a protective coating or plating of zinc on plumbing fixture fittings and trim; (2) universal portable electric tools as defined in L-216; (3) for portable pneumatic tools; (4) for light power driven tools as defined in L-237; (5) for data, instruction and identification plates; (6) for air compressors; (7) for airline, water and oil separators; (8) for air regulators as part of spraying equipment.

A few prohibited uses have been added to List A in the order, including lock parts, costume jewelry, vending machines, closures, handbag fittings, photographic equipment.

Priority Changes

E-10—Amended order tightens restrictions on the delivery of surplus stocks of antifriction bearings. (11-11-43)

L-54-c—Int. 2 clarifies restrictions of delivery of office machinery. (11-8-43)

L-63—Amended order eases record-keeping requirements for supplies of heavy industries. (11-12-43)

L-68—Revised order removes all restriction on the use of steel in closures. (11-9-43)

L-102—Amended order lifts ban on sale of some used electric generating equipment. (11-8-43)

L-140-b—Order grants permission for the production of durable flatware for restaurants, institutions and home use but has restricted this production to essential eating utensils. (11-8-43)

L-270—Amended order tightens regulations controlling the production and distribution of automotive maintenance equipment. (11-8-43)

L-272—Sched. IV revises the limitations on the design and production of indicating dial pressure gages. (11-11-43)

L-272—Sched. VII eliminates a number of sizes, types and special features of industrial and special purpose thermometers. (11-11-43)

L-300—Amended order removes restrictions which prohibited the manufacture of circuit breakers containing shunt trips, under-voltage trips, auxiliary indicator switches or alarm switches. (11-11-43)

L-318—Int. 1 clarifies the provisions applying to the manufacturers of spot welding electrodes. (11-11-43)

L-322—Order simplifies and standardizes the models and sizes of mechanical, hydraulic, air and electrically operated jacks. (11-8-43)

M-11-b—Amended order adds a number of general exceptions to restrictions formerly imposed by List A, and also makes a number of substitutions for items formerly appearing on List A. (11-11-43)

M-21-3—Amended order clarifies restrictions on tin plate, terne plate and tin mill black plate. (11-8-43)

M-199—Amended order makes many changes, the chief one being the simplification of tall operations. (11-11-43)

P-84—Amended order clarifies and simplifies restrictions on plumbing and heating emergency repairs. (11-9-43)

Price Briefs

• Amdt. 104 to MPR 136 authorizes permission for sellers, lessors or suppliers of machines and parts, and machinery services to enter into adjustable pricing contracts pending OPA action on an application for adjustment of the seller's maximum prices. (Release No. OPA-T-1436)

• Order 19 of Amdt. 1 to RPS 41 extends the permission to use adjustable pricing on certain railroad castings to Dec. 15.

• Int. 7 of MPR 1 points out that in placing orders for materials other than controlled materials and Class A products, manufacturers may, in some cases, take into consideration minimum production runs of their suppliers as well as the immediate needs of their own plants. (Release No. WPB-4558)

Additional CMP Developments

• Dir. 36 to Reg. 1 makes an exception to the prohibition against passing along allotments of controlled materials to make B products.

• Int. 21 of Reg. 1 permits temporary loans of controlled materials and Class A products obtained pursuant to an allotment. (Release No. WPB-4557)

• Int. 22 of Reg. 1 explains in what manner a producer may reject an order for a shipment of steel, copper or aluminum.

Pittsburgh Steel Reports

• • • **Pittsburgh Steel Co.** reports a net profit for the quarter ended Sept. 30, 1943, after deduction of depreciation, depletion, amortization, and Federal, excess profits and State taxes, of $338,760.77. The net profit for the nine-month period ended Sept. 30, 1943, is $1,360,285.65.

ARISTOLOY

precision-controlled

ELECTRIC FURNACE STEELS

HIT THE MARK

The electric furnace delivers top quality steels consistently and accurately. The chemical analyses and specifications of stainless, aircraft quality, special alloy, and tool steel, must be precision controlled. To hit these close specification marks, the steel maker relies upon the electric furnace as the most efficient method of control.

Aristoloy steels are electric furnace steels. They are the controlled top quality steels demanded by the battlefronts of today and the peacetime products of tomorrow.

COPPERWELD STEEL COMPANY WARREN, OHIO

ARISTOLOY STEELS

AIRCRAFT QUALITY STEELS
BEARING QUALITY STEELS
CARBON AND ALLOY TOOL STEELS
STAINLESS STEELS · NITRALLOY STEELS

ELECTRIC FURNACE STEELS

Scheduling and Restrictions on Anti-Friction Bearings Tightened by WPB

Washington

• • • **Tighter restrictions** on the delivery of surplus stocks of anti-friction bearings are contained in General Preference Order E-10 as amended by WPB.

The amended order provides that notwithstanding the provisions of Priorities Regulation No. 1, any person who has obtained anti-friction bearings with priorities assistance who no longer requires them for the purpose for which the priorities assistance was granted, may dispose of them only in one of the following ways:

(1) The bearings may be redelivered to the persons from whom they were obtained, if such person is willing to accept redelivery; or (2) the bearings may be disposed of to fill any order rated AAA; or (3) the bearings may be disposed of to fill any order rated AA-5 or higher placed by the Army, Navy, Maritime Commission or War Shipping Administration, or by any prime or sub-contractor of any of them; or (4) if the quantity of bearings which he wishes to dispose of in any calendar month had a total cost to him of $250 or less, he may dispose of them to fill any order placed with him rated AA-5 or higher; or (5) if the quantity of bearings which he wishes to dispose of in any calendar month had a total cost to him in excess of $250 and if they are not being disposed of pursuant to the above methods, he must apply to WPB for permission to dispose of the bearings.

The amended order places the quarterly scheduling period for each producer's total production of anti-friction bearings on a calendar basis, beginning Jan. 1, 1944. It provides that each producer shall schedule his total production for the four months' period September, October, November and December, 1943, and his total quarterly production beginning Jan. 1, 1944, in such a manner as to make available during such period or quarter 85 per cent of his production for delivery against production orders and 15 per cent for delivery against miscellaneous orders. These percentages may be varied by any producer, however, if he does not have enough unfilled purchase orders and estimated future orders reasonably anticipated to be received within the next 90 days to absorb one or the other of the percentage allocations.

Because of amendments to General Scheduling Order M-293 and the provision in that order that it now supersedes the operations reports and schedules of Order E-10, a new paragraph states that specific operations with respect to delivery requirements of bearings will be made under Order M-293 where necessary.

The amended order provides the sequence of deliveries against production orders shall be scheduled according to the terms of Priorities Regulation No. 1 and other applicable regulations of WPB, and provides a 30-day "frozen" period instead of the normal 15-day period under Priorities Regulation No. 1. This is, material specifically produced for an order for anti-friction bearings rated AA-5 or higher shall not be diverted and delivered under a higher rated order subsequently accepted if such material is completed at the time of the acceptance of the higher rated order or is in production and scheduled for completion within 30 days thereafter, unless such diversion is specifically directed by WPB or the subsequently accepted order bears a rating of AAA.

The base rating on deliveries of bearings is raised to AA-5 with the proviso that orders placed prior to November 10, 1943, may be delivered on a rating of A-10 or higher.

RECALL INLAND'S EARLY DAYS: On the site of the Inland Steel Co.'s start of operations in 1893, veteran employees of the firm's Chicago Heights plant look over an album of pictures with Henry H. Straus, Inland vice-president (second from left). Others, left to right are Guy Petrarca, employed since 1901; C. B. Murton, employed since 1903; R. J. Jonston, employed since 1897, and Frank Klauck, who started in 1894.

•

Tin and Terne Plate Restrictions Eased

Washington

• • • **WPB** recently issued supplementary order M-21-e, as amended, clarifying restrictions on tin plate, terne plate and tin mill black plate. Under the order it is permissible to recoat material in a number of applications. Thus permitting the salvage of misprinted or rusty material. Minimum practicable coatings in excess of 1.25 lb. per base box for hot dipped tin plates, in gauges heavier than 112 lb. per base box, are permitted. Tin or terne plate coated with less tin than specified in Schedule A for any permitted use, is specifically allowed in the amended order to remove any doubt on this point.

The provision restricting use of tin to the quarterly quota assigned by WPG was removed. Since production is now restricted by production directives, this provision was unnecessary. Eight items have been added to List A and the words "but only for replacement" have been removed from application to wick holders for oil stoves. Also, under the amended order, items of less than five net tons of tin plate short ternes or long ternes in the inventory of a person not regularly engaged in the sale of such material, are released from control.

The Answer to Your Question

YES... there are RACO ELECTRODES for every A. C. welding job

THEY NOT ONLY MEET, BUT SURPASS, *RIGID SPECIFICATIONS*

RACO H-D #11. Electrodes have been thoroughly tested in all positions on A.C. welding jobs for mild steel. They assure a superior X-Ray clean weld, free from gas pockets and slag inclusions. ***Equivalent results are obtained with direct current reverse polarity.***

RACO H-D #11. Electrodes comply with the following specifications:—A.W.S.—A.S.T.M. Filler Metal Specifications A233-42T Classification E6011; Navy Bureau of Ships Specification 46E3, Grade III, Classes 1,2,3; American Bureau of Shipping Specifications HIG and BIG: A.S.M.E. Boiler Code, Paragraph U68.

Write for samples and literature, and for information on delivery of the right *Raco* Electrodes for every A.C. welding job.

The REID-AVERY COMPANY

DUNDALK BALTIMORE 22 MARYLAND

Big NE Steel Output Seen; Nickel Aided

• • • About 4,250,000 tons, or about one-third of America's 1943 production of alloy steels, will consist of the low-alloy NE steels, the American Iron & Steel Institute has estimated.

Conversion to the NE series is expected to save the nation 24,000 tons of nickel. The nickel saving will be accomplished at the cost of no increase in the use of chromium and with rises of only 3000 tons for molybdenum and 8000 tons for manganese.

On typical grades of NE steels, made either in the open hearth or electric furnaces, as much as 30 per cent of the chromium content, 25 per cent of the molybdenum, and 50 per cent of the nickel requirements are obtained from the charges of selected alloy steel scrap which go into the melts.

Freight Increases Postponed By ICC

Washington

• • • OPA has received notice from the Interstate Commerce Commission that on Nov. 8 the commission decided to suspend through June 30, 1944, freight rate increases that were to have gone into effect Jan. 1, 1944.

A request that the increases not be allowed to go into effect on Jan. 1 was made of the ICC on Oct. 30 by the Price Administrator, the Director of Economic Stabilization, and the War Food Administrator. They estimated that the increases would, on an annual basis, cost the government, farmers, business men and private consumers more than $300 billion.

Adjustable Pricing Permitted On Machines, Services

Washington

• • • Permission for sellers, lessors or suppliers of machines and parts, and machinery services to enter into adjustable pricing contracts pending OPA action on an application for adjustment of the sellers' maximum prices was authorized last week by OPA.

To define clearly just what type of adjustable pricing is permitted, OPA added to the regulation establishing maximum prices for machines and parts, and machinery services, the same standard adjustable provision that has been added to other regulation.

The seller may agree with the buyer (or lessee) to charge a price which can be increased up to the maximum price in effect at the time of delivery if (1) a request for a change in the applicable price is pending; (2) authorization is necessary to promote distribution or production; and (3) it will not interfere with the purposes of the Emergency Price Control Act of 1942, as amended.

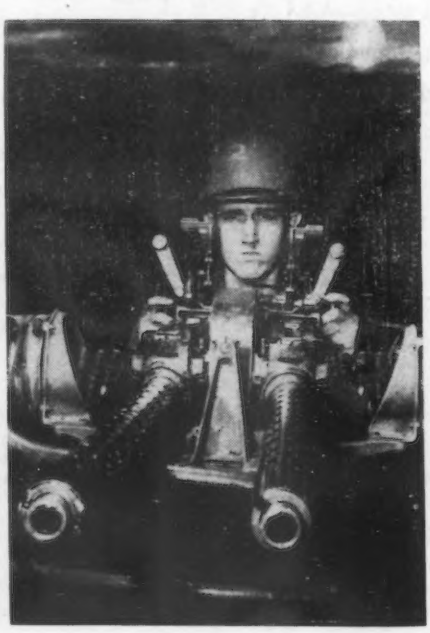
This action is taken through Amendment No. 104 to Maximum Price Regulation 136 and became effective Nov. 9, 1943.

Continue Temporary Price Provisions on Rail Castings

Washington

• • • OPA has issued Amendment No. 1 to Order 19 under RPS 41, extending the permission to use adjustable pricing on certain railroad castings to Dec. 15. The order, as originally issued last October, permitted adjustable pricing on miscellaneous freight car castings in accordance with action, if any, taken by OPA and effective prior to Nov. 15. The Industry Advisory Committee has recommended an increase be made in prices in order to promote the production of these castings. OPA has received the information necessary to its decision but has not had sufficient time to analyze and consider it in order to arrive at a decision. The decision, however, will soon be made and action, if any, should be effective prior to Dec. 15, 1943.

READY FOR BUSINESS is this PT gunner as he draws a bead with his "twin fifties."



Steel Payrolls Soar; Employment Declines

• • • Payrolls of the steel industry reached a new peak of $143,769,000 in September, according to the American Iron & Steel Institute. The record-breaking September payroll was one million dollars greater than the previous peak of $142,769,000 in July. August steel payrolls totaled $139,855,000. In September a year ago, $124,777,000 showed an increase of 15 per cent over the past 12 months.

Employment in steel plants again declined. In September, an average of 620,000 employees was at work, compared with 625,000 in August and 640,000 in September 1942.

Average hourly earnings rose to a new peak of $1.160 per hour in September. The number of hours worked per week by wage earners in that month averaged 45.3, indicating an average weekly wage of approximately $52.55. That weekly wage compared with $48.85 per week in August.

Copper Supply Puts End To Premium Price Grants

Washington

• • • WPB announced last week that it has advised the Quota Committee Premium Price Plan not to accept any applications postmarked after Dec. 31, for special copper premium prices under the plan effective since May 1, 1943. The ruling will not affect applications filed before Dec. 31. Such applications will be considered on their merits as heretofore.

This limitation on the consideration of applications for special copper premium prices is due to the success of efforts towards balancing the copper supply with the requirements of the armed services and the most essential civilian uses.

Order Simplifies Thermometers

Washington

• • • As a further step in the program of simplification of industrial type instruments, Schedule VII was added to Order L-272 by WPB last week. The new schedule eliminates a number of sizes, types and special features of industrial and special purpose thermometers. It provides that cases and case fronts shall not be made of copper or copper alloy other than copper tubing, copper alloy tubing, or cylindrical extruded shapes.

Cuprodine

A UNIQUE METAL LUBRICANT

CUPRODINE is more than a lubricant—it is a chemical which reacts with the steel, dissolving such minute quantities as are necessary to form a thin, adherent copper coating.

Cuprodizing wire to facilitate drawing, is widely practiced in the mills. Cuprodizing strip, blanks, cups and shell cases of steel has improved drawing and speeded production.

Directions for the use of CUPRODINE and for analysis and control of solution are given in the ACP Technical Service Data Sheet which will be sent upon request.

RODINE

Save Steel with RODINE Controlled Acid Bath. RODINE saves steel by inhibiting the attack of pickling acid on steel without retarding the removal of scale or rust. RODINE cleans more steel in less time. RODINE eliminates the danger of over pickling.

CHEMICALS ACP PROCESSES

Cuprodine *Improves Drawing*

Cuprodine *Speeds Drawing Operations*

Cuprodine *Insures Longer Die Life*

Cuprodine *Assures Fewer Rejects*

Manufacturers of Inhibitors & Metal Working Chemicals

AMERICAN CHEMICAL PAINT CO.

AMBLER ACP **PENNA.**

Note: West Coast Plants may address inquiries and orders for prompt delivery to: Leon Finch, Ltd., 728 East 59th St., Los Angeles, Calif.

American Chemical Paint Company, Ambler, Pa.

Please send me general Technical Service Data Sheets on

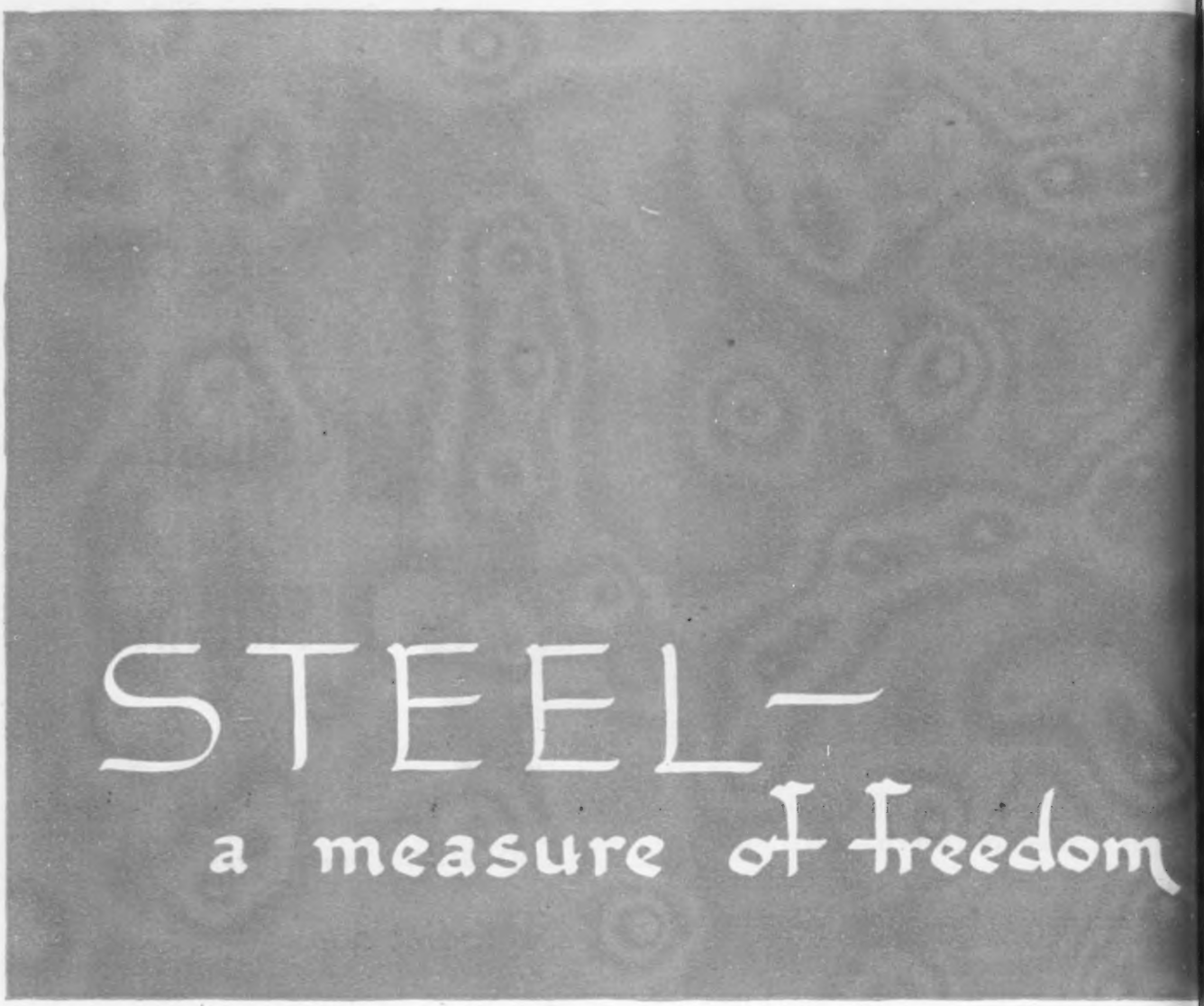
☐ Cuprodine ☐ Rodine

*Name*_____ *Title*_____

*Company*_____

*Address*_____

E E-11



COPYRIGHT 1943—JONES & LAUGHLIN STEEL CORPORATION

In the time of the Revolution, our colonial furnaces produced 30,000 tons of iron a year. Out of this tonnage, General Washington armed his troops and won our freedom.

★ ★ ★

In this war of the world . . . America is producing more than 90 million tons of steel ingots a year — more than all of the rest of the world combined — with virtually every ton going into fighting steels for our fighting men.

★ ★ ★

Such is the measure of the growth of our iron and steel industry in the years of our Republic. And the very growth of our country has been written in the fiery chapters of steel's expansion . . . for it is steel that built our industries, our railroads, our highways, our towns and cities, and knit this continent into a community by the development of our rich resources. So we have enjoyed our freedom . . . and by enterprise, ingenuity, science, and skill created a way of life and living that is American.

FROM AN ORIGINAL DRAWING BY ORISON MACPHERSON

Holding fast to this freedom—securing it anew for the brave, new era that lies ahead for America—is now the measure of steel's productivity in overwhelming quantity as it serves directly on all fronts and helps to marshal other materials and metals for military duty.

★ ★ ★

First of our fighting metals . . . steel is likewise the strongest, most serviceable, adaptable metal for the peaceful arts. It is in this role that steel looks to the future, for this war that has sharpened steel's fighting tools has also put a keen edge on its ambition and ability to create new things for a new world of peace and progress and prosperity.

★ ★ ★

With steel we measure our freedom . . . secure it . . . defend it . . . share it with all mankind.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH, PENNSYLVANIA

J&L STEEL CONTROLLED QUALITY STEEL FOR WAR

Industrial scrap helps win the war...keep your scrap moving to the steel mills.

Reporting Eliminated on Some of Alloys

Washington

• • • Small-order exemptions have been extended to the use of metal alloys, such as chromium, nickel, molybdenum, cobalt, tungsten and vanadium. Users who require a minimum amount per month will hereafter be excused in filing report Forms WPB-1837 and 1838. W. O. Sweeny, of the Steel Division, has written to all producers of hard-facing materials:

Effective immediately producers of hard-facing materials using less alloys in a month for all purposes than the small order limits, specified in the various alloy orders, will not be required to file WPB-1837 and 1838 for that month.

The small order provisions referred to are currently as follows:

3000 lb.	Contained	Chromium
1000 lb.	"	Nickel
500 lb.	"	Molybdenum
25 lb.	"	Cobalt
25 lb.	"	Tungsten
10 lb.	"	Vanadium

Note that when the total usage of any alloy exceeds the limit specified above, it will be necessary to report the amounts of all other alloys used in conjunction with such alloy on WPB-1837.

o o o

WPB Aids Dealers By Clarification

Washington

• • • In order to remove an inequity caused by definition of "warehouses" and "dealers," WPB issued Order M-21-b-2, as amended. The amended order provides that a distributer may be classified as a warehouse as regards one product and as a dealer regards another. This redefinition takes care of situations in which a dealer received one product (such as nails) direct from a producer, and thus became classified as a warehouse. Such classification gave him a base tonnage in nails alone and barred him from dealing in another product (such as galvanized sheets) which he might have bought from warehouses, since the original order prohibited a warehouse from dealing in any product for which it had no base tonnage.

The amended order also provides that orders placed with warehouses by dealers shall be given the status of authorized controlled materials orders only after acceptance by the warehouse. This will permit warehouses to distribute available material equitably among their dealer-customers, rather than be forced to fill early orders in full to the detriment of late comers.

o o o

Steel Warehouses To Report Quarterly

• • • Instead of being required to file monthly reports on general steel products, WPB will now permit steel warehouses to make only quarterly reports. In an announcement sent out under the signature of J. T. Whiting, warehousemen were advised that their next report to be submitted is for fourth quarter and is due Jan. 10, 1944.

The revised form in Part I of the report no longer requires warehouse deliveries to be analyzed between deliveries on specific allotment numbers and deliveries on all other orders. The announcement also declared that stainless steels and other alloy steels will be reported in totals for each type of steel instead of by products. Part II requires warehousemen to distribute deliveries of each type of steel according to the claimant agencies listed in italics on CMPL-449. In filling out Part III it is now necessary to report orders placed with producers which will be filled from (1) scheduled rollings and (2) other than scheduled rollings.

•

Frozen Schedules to Retain Status Under M-293

Washington

• • • All purchase orders which were approved or delivery schedules which were frozen prior to Sept. 17, under provisions of orders superseded by Order M-293, as amended that date, retain their approved or their frozen status, WPB announced last Friday as it issued Direction 1 to General Scheduling Order M-293, as amended Sept. 17.

This rule holds true despite the fact that classifications of some items were changed by the Sept. 17 amendment and that some procedures with respect to specific items have been changed. Manufacturers of such items must continue to observe any frozen schedules or specific directions which they received under the earlier procedures.

Where purchase orders for Class Y items under Order M-293, or for items covered by similar procedures under other orders which have been superseded, were approved under the previous procedure, the approval remains effective and the person with whom the order is placed must accept the schedule accordingly, even if he receives it after the item has been reclassified.

•

New Plan for Adjusting Allotment Records

• • • Since a large number of applicant's statements of allotments in Section D of CMP-4B applications differ from the Industry Division's record of the same allotment, WPB has devised a plan whereby a contractor's record of allotments may be adjusted to the records of the Industry Divisions. Form CMPL-500 has been designed for this purpose and the Industry Divisions have been instructed to correct those records in all cases where it appears the contractor's estimates differ by more than a specified minimum amount.

•

Allotments to "B" Producers Clarified

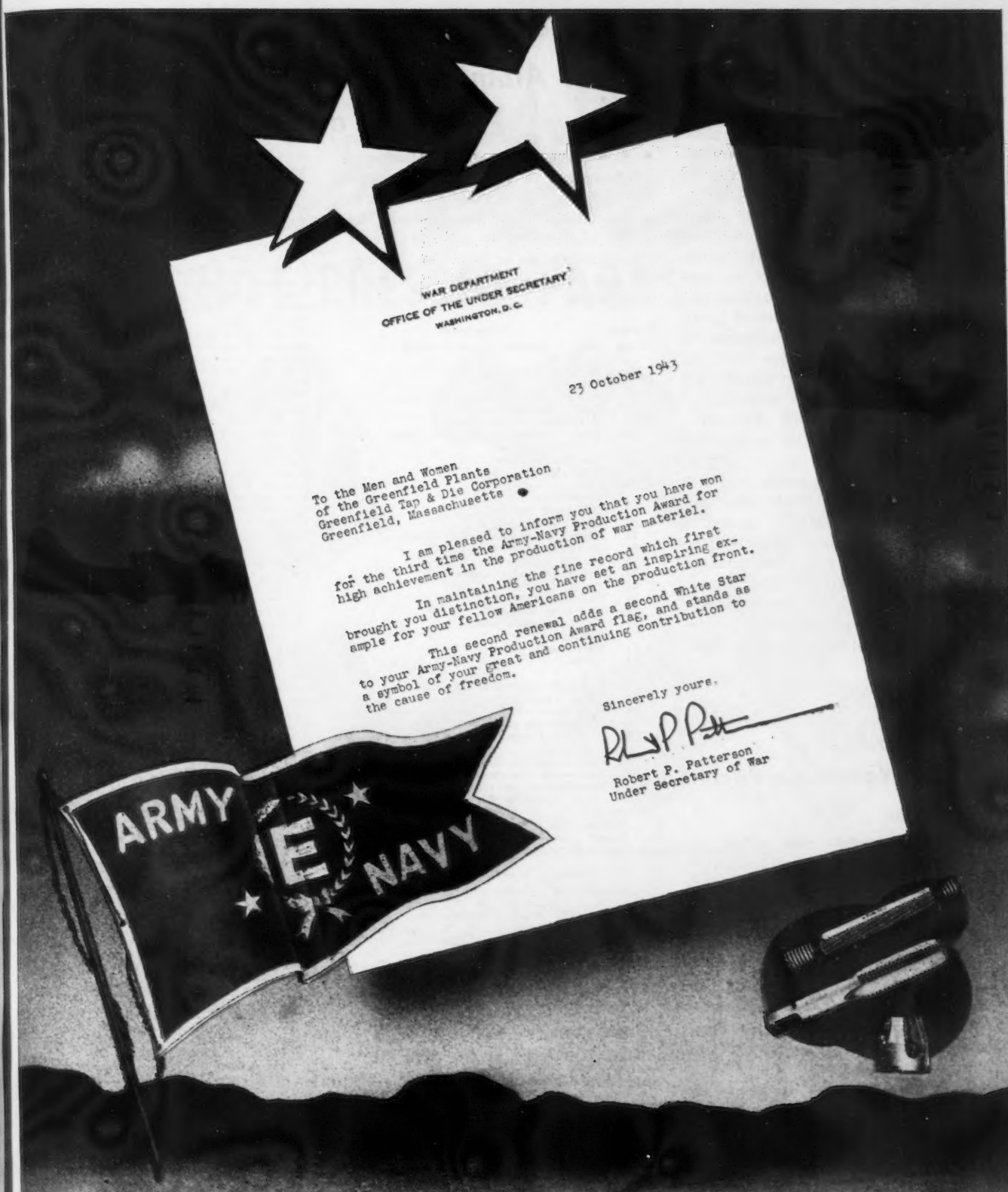
Washington

• • • WPB recently announced conditions under which purchasers of Class B products may make allotments of controlled materials to Class B product producers. These conditions were set forth in Direction 36 to CMP Regulation 1.

The Direction provides that customers may make allotments to Class B product manufacturers in two instances:

1. Where the customer has obtained an allotment or material believing, in good faith, that he would make the product himself and finds that unforeseen contingencies prevent him from doing so.

2. Where the customer designs and engineers a product and it is his practice to subcontract for the production of all or a portion of products which he designs and engineers and the actual manufacturer is not in a position


WAR DEPARTMENT
OFFICE OF THE UNDER SECRETARY
WASHINGTON, D. C.
23 October 1943
To the Men and Women
of the Greenfield Plants
Greenfield Tap & Die Corporation
Greenfield, Massachusetts
I am pleased to inform you that you have won for the third time the Army-Navy Production Award for high achievement in the production of war materiel.
In maintaining the fine record which first brought you distinction, you have set an inspiring example for your fellow Americans on the production front.
This second renewal adds a second White Star to your Army-Navy Production Award flag, and stands as a symbol of your great and continuing contribution to the cause of freedom.
Sincerely yours,
Robert P. Patterson
Under Secretary of War
ARMY
E
NAVY

One of the most important reasons for the large number of loyal users of "Greenfield" tools has been the traditionally high quality always associated with our name. Our normal distribution, however, has frequently been disrupted by the demands of the war program which many times resulted in the shifting of emphasis from what we would have LIKED to do, to what we HAD to do. Whether you are one of those users of cutting tools whose patronage we have enjoyed, or will enjoy in the future, you can still count on "Greenfield" QUALITY, and our earnest desire to help YOU with your war production problem.

GREENFIELD TAP AND DIE CORPORATION GREENFIELD MASSACHUSETTS

to anticipate requirements of materials or components for making it.

These two cases are exceptions to the general rule which prohibits allotments of controlled materials to Class B product manufacturers except by WPB.

However, when a customer wants to make an allotment of controlled materials to a supplier for the manufacture of a Class B product, he must satisfy himself that his supplier has neither applied for nor received an allotment of controlled materials to make the Class B product for him, and the supplier must not accept such allotments of controlled materials if he has either applied for or received allotments to make the product in question.

The Direction also points out that applications for allotments must not include controlled material needed to make Class B products which will be incorporated in the product covered by the application, and that a customer must not make an allotment for a Class B product unless he has received an allotment covering such product.

o o o

OPA Clarifies Warehouse Pricing

Washington

• • • **Warehousemen and other** resellers of iron and steel products were provided with an interpretation concerning the freight factor used in computing their ceilings by OPA last week.

The "rail rate of freight" as now defined affects the pricing of all products covered by Revised Price Schedule No. 49 (Resale of Iron or Steel Products) with the exception of oil country tubular goods.

"Rail rate of freight" is defined by OPA as the lowest filed or published rail traffic rate. It is necessary in computing maximum delivered prices for resale of these iron and steel products under RPS 49 to use the lowest freight charge.

The rail tariffs speak of the lowest charge for the shipment; that is, for the total quantity. The ceilings provided in the OPA price schedule are on the other hand generally per 100 lb. It is therefore necessary after determining the total charge for freight under the rail tariffs to divide such charge by the actual quantity involved to determine the applicable rate per 100 lb. in computing maximum prices.

List of Aluminum and Magnesium Producers and Fabricators Issued

• • • **Codes** have been established for purposes of this list, to indicate the different aluminum products shown. These code numbers are not to be confused with any other code lists in existence at this time, but are for use only in translating the attached list.

Product Code	Aluminum Product Manufactured
..	Alumina
..	Primary ingot
..	Secondary ingot
..	Powder, paste, flake, and grain
..	Rolled rod and bar
11	Extruded rod and bar
16	Wire (other than metallizing and welding wire)
..	Metallizing wire
..	Welding wire
18	Cable
..	Rivets
31	Propeller forgings
32	Crankcase forgings
33	Other large hammer forgings
34	Small hammer forgings
35	Forged pistons
36	Forged cylinder heads
37	Press forgings
39	Impact extrusions
43	Extruded shapes
46	Extruded tube blooms
..	Tubing
61	Sheet and plate
62	Strip
..	Foil
71	Cylinder head sand castings
72	Other heat-treated sand castings
73	Non heat-treated sand castings
74	Heat-treated permanent mold castings
75	Non heat-treated permanent mold castings
76	Cold chamber die castings
77	Gooseneck die castings
..	Distributers (warehouses)

Alumina Plants

Aluminum Co. of America, East St. Louis, Ill.; Mobile, Ala.; Baton Rouge, La.; Hurricane Creek, Ark.

Reynolds Metals Co., Listerhill, Ala.

Primary Ingot Producers

Aluminum Co. of America, Alcoa, Tenn.; Badin, N. C.; Massena, N. Y.; Niagara, N. Y.; Vancouver, Wash.; Burlington, N. J.; Jones Mills, Ark.; Queens, N. Y.; Riverbank, Cal.; Spokane, Wash., Troutdale, Ore.

Olin Corp., Tacoma, Wash.

Reynolds Metals Co., Listerhill, Ala.; Longview, Wash.

Secondary Ingot Producers

Alloys & Products, Inc., Bronx, N. Y.

Alter Co., Davenport, Iowa.

Aluminum & Magnesium, Inc., Sandusky, Ohio.

Aluminum Smelting & Ref. Co., Maple Heights, Ohio.

Apex Smelting Co., Chicago.

Aurora Refining Co., Aurora, Ill.

Barth Smelting Corp., Newark.

Belmont Smelting & Ref. Co., Brooklyn.

Berg Metals Co., Los Angeles.

Bohn Aluminum & Brass Corp., Aluminum Refiners Division, Detroit.

W. J. Bullock, Inc., Birmingham.

Cleveland Electro Metals, Cleveland.

L. S. Cohen & Co., Chicago.

L. A. Cohn & Bros., Inc., Chicago.

Duquesne Smelting Corp., Pittsburgh.

Federated Metals (Div. Amer. Smelting & Refining Co.), Detroit.

Frontier Bronze, Niagara Falls, N. Y.

General Smelting Co., Philadelphia.

Samuel Greenfield Co., Buffalo.

Hamden Smelting Co., Hamden, Conn.

Henning Brothers & Smith, Inc., Brooklyn.

High Duty Bronze Co., Seattle.

Wm. F. Jobbins, Inc., Aurora, Ill.

Morris P. Kirk & Sons, Inc., Los Angeles.

H. Kramer Co., Chicago.

R. Lavin & Sons, Inc., Chicago.

Lehman Brothers, Hoboken, N. J.

Lewin-Mathes Co., East St. Louis.

R. E. Locher & Schefrin, Milwaukee.

National Smelting Co., Cleveland.

New Jersey Metals Co., Elizabeth, N. J.

Niagara Falls Smelting & Refining Co., Buffalo.

North American Smelting & Refining Co., Philadelphia.

Rochester Smelting & Refining, Rochester, N. Y.

George Sall Metals Co., Philadelphia.

Theodore Sall, Los Angeles.

M. Seligman Co., Chicago.

Silverstein & Pinsof Co., Chicago.

Sonken Galamba, Inc., Kansas City, Kan.

South Bend Smelting & Refining, South Bend, Ind.

Stoll Metal Corp., Long Island City, N. Y.

Torrance Aluminum Products Co., Torrance, Cal.

U. S. Metals Refining Co., Carteret, N. J.

U. S. Reduction Co., East Chicago, Ind.

Hyman Viener & Sons, Richmond, Va.

Western Metals Co., Chicago.

Powder, Paste, Flake, and Grain

Aluminum Co. of America, Alcoa, Tenn.; New Kensington, Pa.

Aluminum & Magnesium, Inc., Sandusky, Ohio.

Apex Smelting Co., Chicago.

O. Hommell Co., Carnegie, Pa.

William F. Jobbins, Inc., Aurora, Ill.

McAleer Mfg. Co., Rochester, Mich.

Metal & Thermit Corp., New York.

Metals Disintegrating Co., Elizabeth, N. J.

National Smelting Co., Cleveland.

Reynolds Metals Co., Louisville.

Studebaker Chemical Co., Elyria, Ohio.

Rolled Rod and Bar

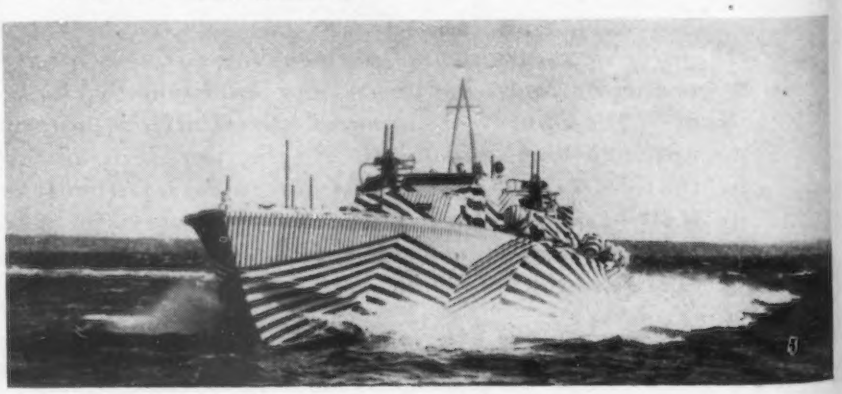
Aluminum Co. of America, Massena, N. Y.; Newark, Ohio.

Reynolds Metals Co., Listerhill, Ala.; Louisville.

Wire and Cable
Product Codes
Wire—16
Cable—18

16, 18, Aluminum Co. of America, Massena, N. Y.

NEW BATTLE DRESS: The American PT boat, which carries the heaviest armament of any boat in the Navy for her size, has a new camouflage to deceive enemy gunners.



Titan delivers HOT PRESSED PARTS

For Victory products, Titan can not only make, but promptly deliver hot pressed parts in quantity. They have a dense, small grained structure, require very little machining, prolong tool life, leave minimum scrap. Intricate shapes, sharp outlines and dimensional accuracy are no problem for Titan. Your inquiry will get prompt, thorough attention with the kind of friendly service which has helped build Titan reputation.

Titan

METAL MANUFACTURING CO.

BELLEFONTE, PA.

Quality Alloys by Brass Specialists

BRASS AND BRONZE
RODS · FORGINGS
DIE CASTINGS
WELDING RODS

Tiering cartons on pallets three high with Baker Fork Truck to conserve storage space.

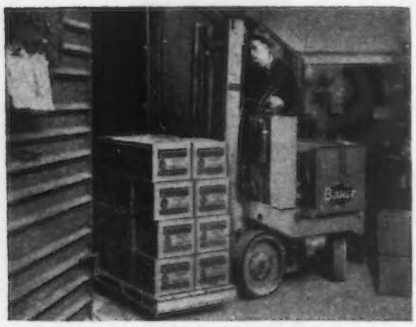
Tiering on racks allows access to underneath pallet load with Baker Fork Truck.

BAKER TRUCKS selected by Sherwin-Williams for model Chicago Warehouse

Horizontal storage on racks allows removal of single drums without disturbing drums above.

When Albert Kahn designed the huge new Chicago warehouse for the world's largest paint manufacturer, no effort was spared to made it the last word in practical efficiency.

Since all of the operations in a warehouse involve material handling, it is highly significant that Baker Trucks and Tractors were specified to play the major role. Drag chain conveyors supplement the trucks to provide one of the most flexible mechanical handling systems of its kind yet developed.



Box car or truck loading is speeded by handling pallet loads with fork truck.

BAKER INDUSTRIAL TRUCK DIVISION
of the Baker-Raulang Company
2175 West 25th Street, Cleveland, Ohio

In Canada: Railway and Power Engineering Corporation, Ltd.

FACTS AND FIGURES

- Warehouse occupies space 288 x 624 ft.
- Has accommodations for 8 railroad cars and 20 highway trucks within building.
- Handling equipment includes fork truck and pallets, tractor and trailers, and conveyors.
- Packages comprise 50 and 30 gal. drums, 5 gal. pails and a wide variety of smaller units in cartons.
- Smaller items alone arrive from production at rates up to 60 per minute.
- More than 10,000 different items are received, sorted, stored, and shipped.

3001-1A-43

Baker INDUSTRIAL TRUCKS

16, Callite-Tungsten Corp., Union City, N. J.
16, Wilbur B. Driver Co., Newark.
16, 18, General Cable Corp., New York.
16, F. A. Harris Co., Inc., Springfield, Ohio
16, Hudson Wire Co., Ossining, N. Y.
18, Nehring Electrical Works, DeKalb, Ill.
16, North American Philips, Dobbs Ferry, N. Y.
16, 18, Phelps-Dodge Copper Products Corp., New York.
16, Rome Cable Corp., Rome, N. Y.
16, W. S. Tyler Co., Cleveland.
16, United Wire & Supply Corp., Providence.

Welding Wire

Air Reduction Sales Co., New York.
Alpine Trading Corp., New York.
Lincoln Electric Co., Cleveland.
Aluminum Cooking Utensil Co., New Kensington, Pa.
Union Carbide & Carbon Corp., New York
Welding Alloys Mfg. Co., Everett, Mass.
Woolridge Aluminum Welding Co., Glastonbury, Conn.

Metallizing Wire

Metallizing Co. of America, Chicago.
Metallizing Engineering Co., Inc., Long Island City, N. Y.
National Tinsel Co., Manitowoc, Wis.

Rivets

Aircraft Bolt & Rivet Co., Pasadena, Cal.
Aluminum Co. of America, Edgewater, N. J.; Massena, N. Y.; Vernon, Cal.
Aluminum Goods Mfg. Co., Manitowoc, Wis.
Bell Aircraft Corp., Buffalo.
Boeing Aircraft Co., Renton, Wash.
Cherry Rivet Co., Los Angeles.
Chicago Rivet & Screw Co., Bellwood, Ill.
Consolidated Aircraft Corp., San Diego, Cal.; Fort Worth, Tex.
Dow Chemical Corp., Bay City, Mich.
E. I. du Pont de Nemours & Co., Wilmington, Del.

RIVETS IN CELLOPHANE: At the plants of the Glenn L. Martin Co., Baltimore, hundreds of thousands of rivets are dispensed from racks like the one shown, each marked with the type, length and diameter of the rivets it contains.

X-Ray on wheels

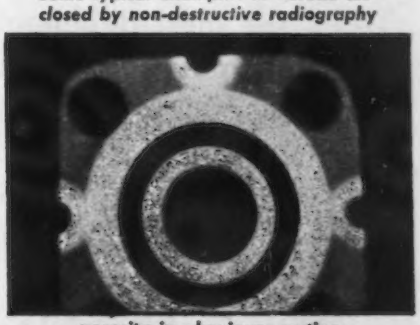
this powerful Mobile 150 KVP X-Ray Unit brings non-destructive x-ray inspection to any part of your plant.

"ON THE SPOT" RADIOGRAPHY The Picker 150 KV Mobile Unit brings comprehensive facilities for X-Ray inspection directly to any point of production in your plant.

This compact, powerful, easily transportable apparatus fulfills every requirement for production inspection or spot checking of many diverse materials . . . metals, plastics, fabric, wood. Completely self-contained, requiring only a current source, the Picker 150 KV Mobile Unit provides positively controlled voltages from 15 KV to 150 KVP, with a radiographic capacity (with screens) up to 1½" of steel and 7" of aluminum. The rapidity of exposures ideally adapts this Unit to consecutive production inspection.

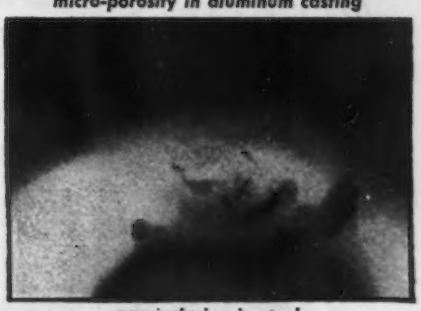
Write today for our bulletin on the Picker 150 KV apparatus, which gives details of construction, capacities and applications. Our engineering staff and research bureau is at your service for the study of any special problems concerning non-destructive radiographic examination.

Some typical examples of defects disclosed by non-destructive radiography

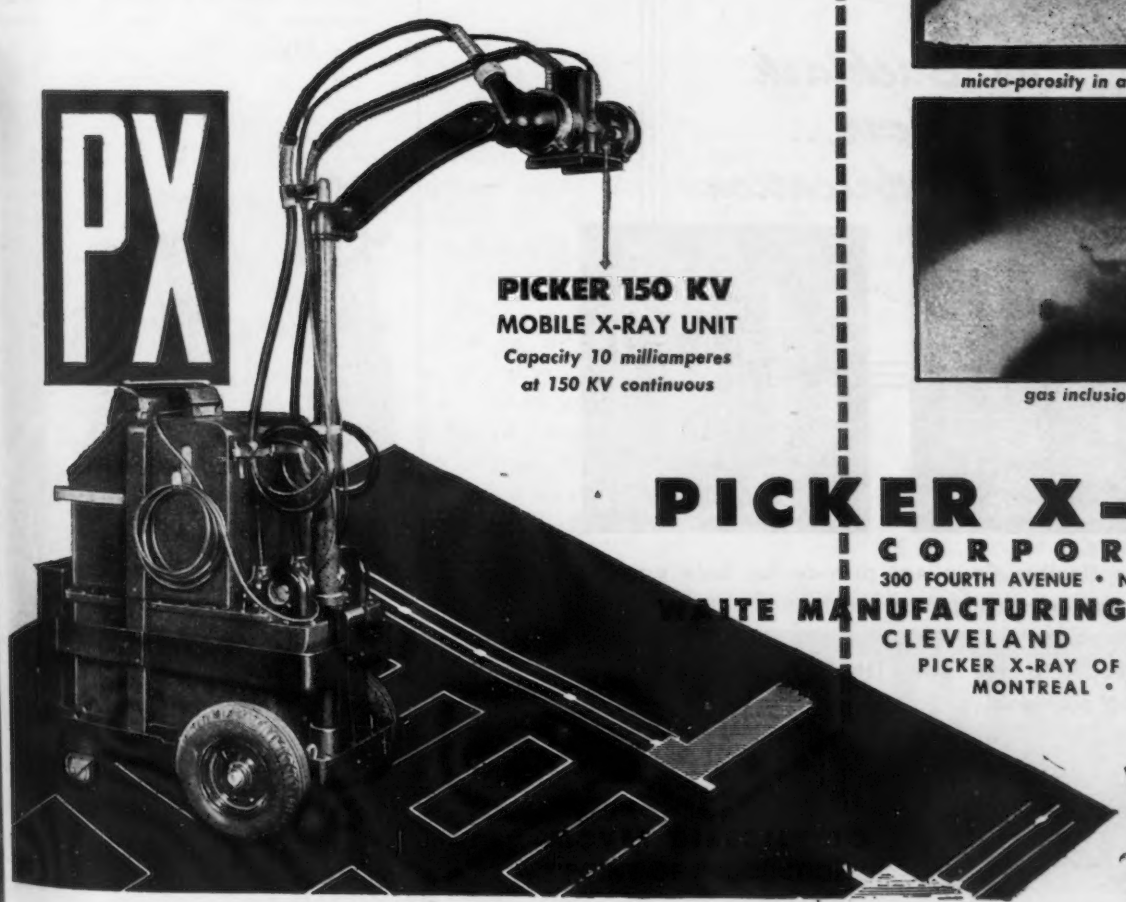


porosity in aluminum casting

micro-porosity in aluminum casting



gas inclusion in steel



PICKER 150 KV
MOBILE X-RAY UNIT
Capacity 10 milliamperes at 150 KV continuous

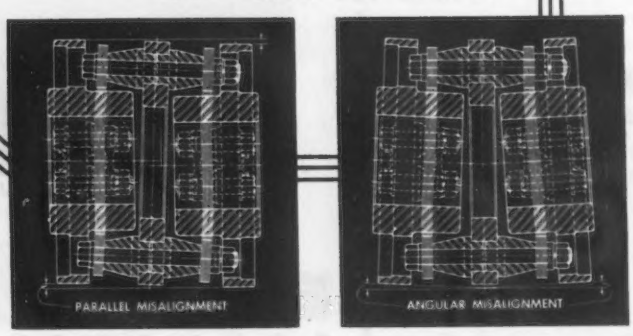
PICKER X-RAY CORPORATION
300 FOURTH AVENUE • NEW YORK 10, N. Y.
[illegible]ITE MANUFACTURING DIVISION
CLEVELAND • OHIO
PICKER X-RAY OF CANADA, LTD.
MONTREAL • TORONTO

First "E" Award in the X-Ray Industry

THOMAS
FLEXIBLE COUPLINGS

The most dependable couplings ever made, Thomas Flexible Couplings have proven far superior to any other type or make of coupling because of their exclusive non-backlash, non-wearing features which eliminate lubrication.

no Backlash
no Wear....
no Lubrication



Thomas Flexible Couplings provide for both parallel and angular misalignment without setting up end thrust or cross pull. Write for our catalog (on your letterhead) to see how THOMAS can solve your coupling problems.

"BUILT TO LAST A LIFETIME"

THOMAS FLEXIBLE COUPLING CO.

WARREN, PENNSYLVANIA

T-3

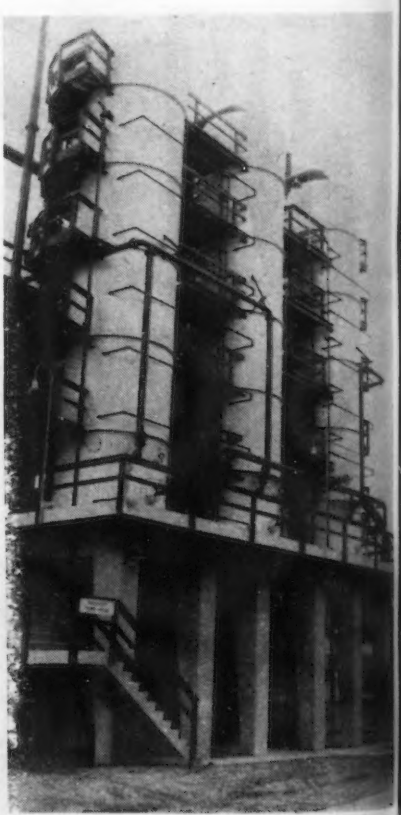
Fibre & Metal Products, Downey, Cal.
Fisher Body Div., GMC, Detroit.
Ford Motor Co., Willow Run, Mich.
General Rivet & Machine Co., Elyria, Ohio.
Goodyear Aircraft Corp., Akron, Ohio.
John Hassall, Inc., Brooklyn.
Huck Mfg. Co., Detroit.
Lockheed Aircraft Corp., Burbank, Cal.
Glenn L. Martin, Baltimore.
Mid-State Mfg. Co., Waupun, Wis.
Milford Rivet & Machine Co., Milford, Conn.
National Screw & Mfg. Co., Cleveland.
Naval Air Factory, Philadelphia.
New Jersey Rivet Co., Camden, N. J.
North American Aviation, Inc., Dallas, Tex.; Kansas City, Kan.
Penn Rivet Co., Philadelphia.
Reed & Prince Mfg. Co., Worcester.
Republic Steel Corp., Cleveland.
Scovill Mfg. Co., Waterbury, Conn.
J. L. Thompson Mfg. Co., Waltham, Mass.
Tubular Rivet & Stud Co., Wollaston, Mass.

Forgings, Pressings and Impact Extrusions Product Codes

31—Propellers
32—Crankcases
33—Other large hammer forgings
34—Small hammer forgings
35—Pistons
36—Cylinder heads
37—Pressings
39—Impact extrusions

37, Accurate Brass Co., Glendale, Cal.
33, 34, Aluminum Co. of America, Canonsburg, Pa.
37, Aluminum Co. of America, New Castle, Pa.
31, 32, 33, 34, 35, 36, 37, Aluminum Co. of America, Cleveland.
37, 39, Aluminum Co. of America, Edgewater, N. J.
37, Aluminum Co. of America, New Kensington, Pa.
34, 37, Aluminum Co. of America, Vernon, Cal.
36, Aluminum Co. of America, Monroe, Mich.

STEEL SUBSTITUTE: Reinforced concrete has replaced steel in some of the structures erected for synthetic rubber plants. Here are shown concrete styrene stripping columns built by the Blaw-Knox Co., Pittsburgh.



OTHER SUPER CARBIDE TIPPED TOOLS FOR

Turning, Facing, Reaming, Spotfacing, Forming, Grinder Rests, Wear Parts, Boring, Drilling, Grooving, Counterboring, Shaving, Centers and Special Purposes.

Of course he's satisfied! Like most production men who use Super Carboloy-Tipped Milling Cutters, he is getting faster, more accurate and more economical milling production. He is typical of users throughout the country who report such amazing production records as these . . . "With Super Milling Cutters we decreased the cutting time on one job 200%," "On a bronze alloy job we increased the number of pieces per grind 700%," "On a steel milling job we now complete a standard run in 2 hours that formerly took 8 hours."

Other users of Super Carboloy-Tipped Milling Cutters will tell you that in cast iron and nonferrous materials they can run at machine capacity with feeds of .002" to .005" per tooth. In steel with tooth loads of .0005" to .0025" they can run at surface speeds of 400 to 800 feet per minute. That's performance you shouldn't overlook in times like these!

Why not learn more of the advantages of these milling cutters that are establishing new records in speed, accuracy and economy on all types of milling operations. Let us send you a descriptive folder.

All sizes available for early shipment

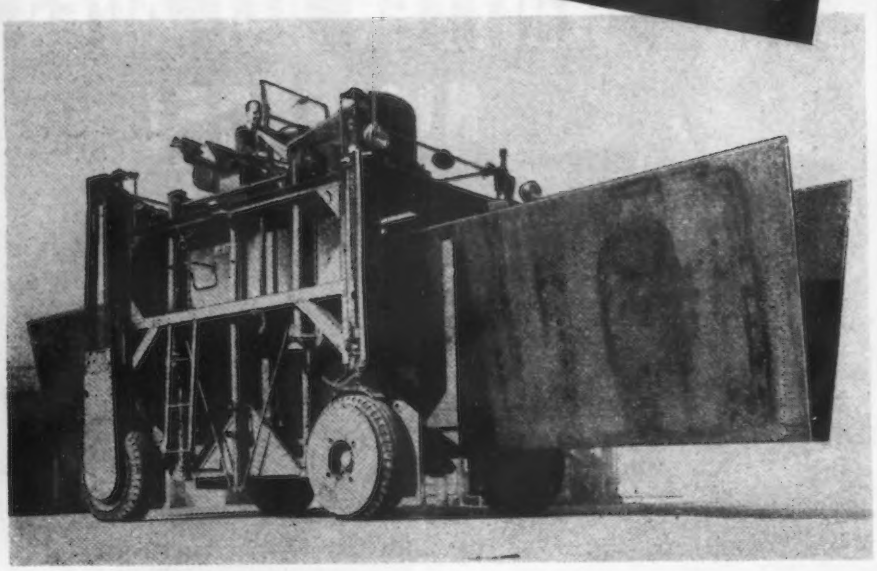
SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Road, Detroit 13, Michigan ★ 4105 San Fernando Road, Glendale 4, California

WHAT DO YOUR HEAVY HANDLING JOBS CALL FOR? ★

This Heavyweight CHAMPION CARRIER



A west coast shipyard economizes by hauling heavy steel plate with a Ross Model 90 Carrier.

or This Rugged LIFT TRUCK

Rapid movement and quick loading mean everything in these days of transportation strain and congestion in mills, freight yards and docks.

The heavy capacity of Ross Series 90 Carriers; the maneuverability and short turning radius of Ross 70 H Carriers, with 4½ ton capacity, and Ross Heavy-Duty Hydraulic Lift Trucks, 3 to 7 ton capacities, furnish the answer to many of your handling problems.

Bulletin 1-113, which tells the full story of these useful, durable, economical machines, will interest you. Write for it today.

THE ROSS CARRIER COMPANY, BENTON HARBOR, MICHIGAN

ROSS

HEAVY DUTY MATERIALS-HANDLING EQUIPMENT

BENTON HARBOR • MICHIGAN

34, 37, Aluminum Forgings, Inc., Erie, Pa.
37, American Coach & Body Co., Cleveland.
34, American Art Alloys, Inc., Kokomo, Ind.
37, American Hard Rubber Co., Akron, Ohio.
34, Artistic Iron Products Co., Cleveland.
37, D. L. Auld Co., Columbus, Ohio.
*Wm. J. Beer Co., Brooklyn.
34, Billings & Spencer Co., Hartford, Conn.
37, Bohn Aluminum & Brass Corp. Plant No. 6, Detroit.
34, Brass Forgings, Inc., Ferndale, Mich.
35, Buick Motor Division, GMC, Flint, Mich.
36, Canton Drop Forgings & Mfg., Canton, Ohio.
37, Chase Brass & Copper, Waterbury, Conn.
36, Chevrolet-Anderson Div., GMC, Anderson, Ind.
32, 33, 34, 37, Chevrolet-Muncie Div., GMC, Muncie, Ind.
31, 32, 33, 34, 35, 37, Chevrolet-Transmission Div., GMC, Saginaw, Mich.
33, 34, 37, Chrysler Corp. (Dodge Div.), Detroit.
*Electric Material Co., North East, Pa.
34, 35, 37, Ford Motor Co., Dearborn, Mich.
37, General Electric Co., Schenectady, N. Y.
34, General Electric Co., Ft. Wayne, Ind.
37, General Extrusion Corp., Hillside, N. J.
34, 37, General Forgings, Inc., Chicago.
*General Metals, Inc., Los Angeles.
34, 37, 39, Harvey Metals Corp., Chicago.
37, Imperial Brass Mfg. Co., Chicago.
37, Industrial Formings, Burbank, Cal.
37, Kohler Co., Kohler, Wis.
34, 37, Lincoln Forging Co., Detroit.
34, 37, Maytag Co., Newton, Iowa.
34, McKaig Hatch Co., Buffalo.
39, McNaught Metal Products Co., Chicago.
34, Moore Drop Forging Co., Springfield, Mass.
37, Motor Parts Co., Calhoun City, Miss.
37, Mueller Brass Co., Port Huron, Mich.
37, Mueller Co., Los Angeles.
34, Naval Air Factory, Philadelphia.
37, Parker Appliance Co., Cleveland.
37, Revere Copper & Brass, Rome, N. Y.
34, 37, Revere Copper & Brass, Chicago.
37, Reynolds Metals Co., Louisville, Ky.
33, 34, 37, Scovill Mfg. Co., Waterbury, Conn.
37, Spengrey Cap Co., Louisville, Ky.
37, St. Pierre Chain Co., Worcester, Mass.
37, Titan Metals Mfg. Co., Bellefonte, Pa.
35, 36, 37, Tube-Turns, Inc., Louisville, Ky.
39, Victor Metal Products Corp., Brooklyn.
37, Weatherhead Co., Cleveland.
34, J. H. Williams & Co., Buffalo.
34, 37, Willys-Overland Motors, Inc., Toledo, Ohio.
34, 35, 37, Wyman-Gordon Co., Worcester, Mass.

*New companies.

Extrusions

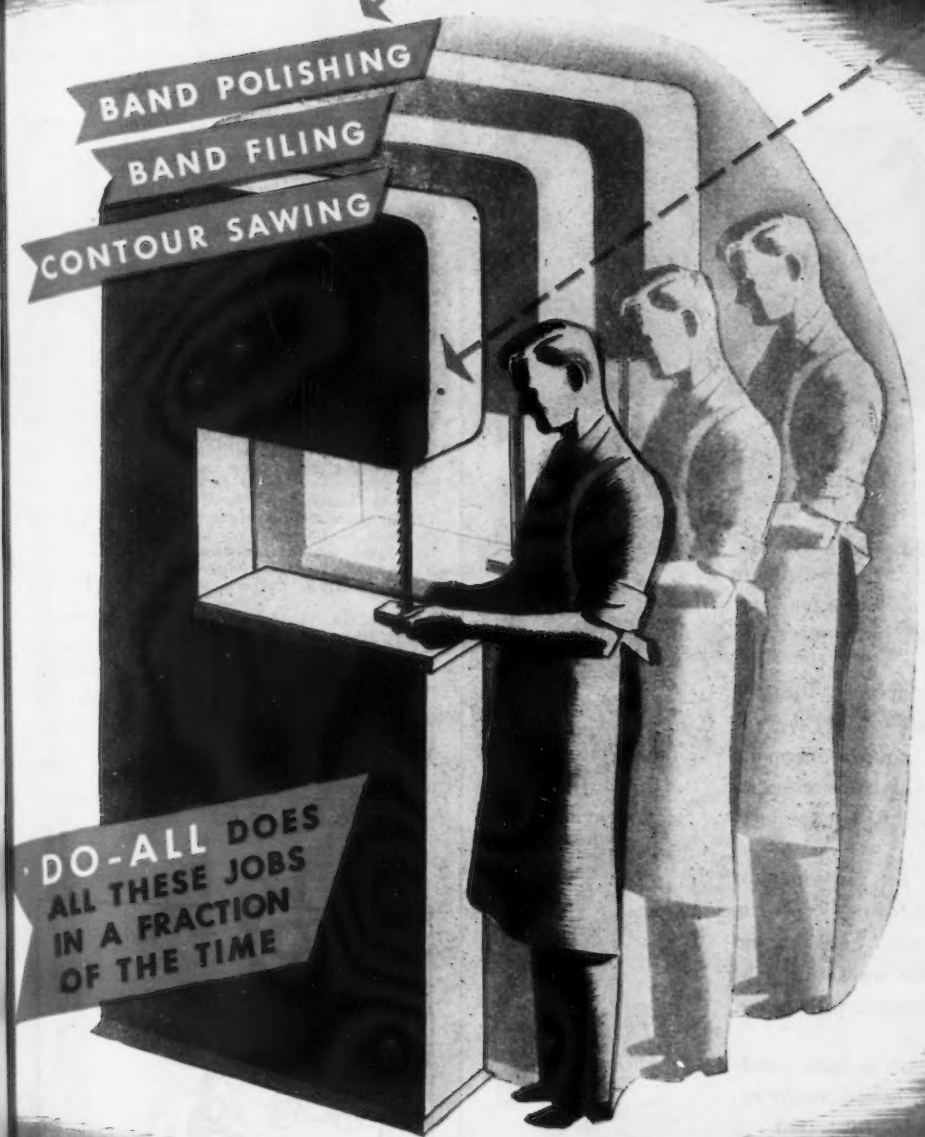
Product Codes
11—Extruded rod and bar
43—Extruded shapes
46—Extruded tube blooms

43, 46, Aluminum Co. of America, Cressena, Pa.
11, 43, Aluminum Co. of America, Detroit.
11, 43, 46, Aluminum Co. of America, Lafayette, Ind.
43, 46, Aluminum Co. of America, New Kensington, Pa.
43, 46, Aluminum Co. of America, Phoenix, Ariz.
11, 43, 46, Aluminum Co. of America, Vernon, Cal.
11, 43, Bohn Aluminum & Brass Corp. Plants Nos. 13 and 24, Adrian, Mich.
11, 43, Bohn Aluminum & Brass Corp. Plant No. 8, Detroit.
11, 43, Bohn Aluminum & Brass Corp. Plant No. 26, Los Angeles.
43, 46, B & T Metals Co., Columbus, Ohio.
11, 43, Central Metal Products, Los Angeles.
11, 43, 46, Extruded Metals, Inc., Belding, Mich.
11, 43, 46, Extruded Metals Defense Corp. Grand Rapids, Mich.
11, 46, Lewin-Mathes Corp., St. Louis.
43, 46, Revere Copper & Brass, Inc. (under construction), Baltimore.
11, 43, Revere Copper & Brass, Inc., Detroit.
11, 43, 46, Reynolds Metals Co., Plant No. 8, Louisville, Ky.

Tubing

Aluminum Co. of America, Cressona, Pa.; Lafayette, Ind.; New Kensington, Pa.; Phoenix, Ariz.
American Brass Co., Waterbury, Conn.
Bohn Aluminum & Brass Corp., Detroit.
Leach & Garner Co., Attleboro, Mass.
Lewin Mathes Corp., St. Louis.
Lindorme Tube Co., Cleveland.
Revere Copper & Brass, Inc., Baltimore.

DO-ALL 3 MACHINES IN 1



SAWS. Cuts shapes in metals, alloys, plastics, plymetals, etc. Does internal or external cutting — follows any design, straight or curved line, through thick or thin sections, with no waste excepting a very fine kerf dust.

FILES. Replace the band saw with a DO-ALL Band File and you're all set for rapid, clean filing that will amaze even experts.

POLISHES. The same machine accommodates DO-ALL Polishing Bands that put a fine finish on any product in double-quick time.

Every shop needs contour sawing and with it band filing and polishing — all possible with these new, time-saving machine tools. Six models priced from $1,000 to $5,000 with motors.

DO-ALL BAND SAWS
100 feet in a special metal Strip-out Container marked with size and style of contents.

DO-ALL BAND FILES
Available in different lengths to fit the model DO-ALL you own. Each in compact box.

DO-ALL POLISHING BANDS
Lengths to fit any DO-ALL Contour Machine. Available in three grits, 50, 80 and 150.

CONTINENTAL MACHINES, Inc.

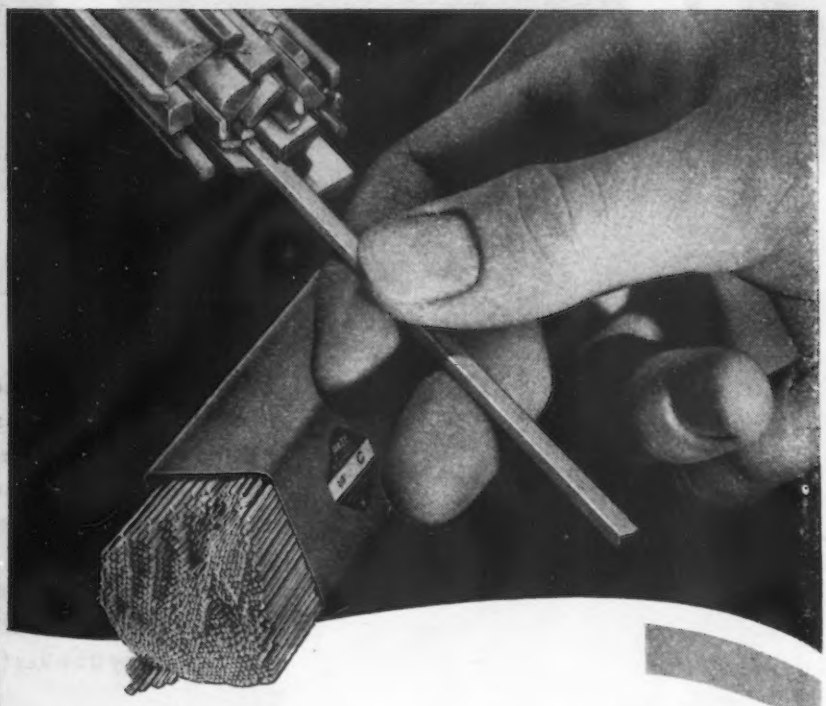
1311 S. Washington Ave., Minneapolis 4, Minn.

DO-ALL Offices in 25 cities, with a staff of trained engineers to give you quick service on Contour Machines, Band Saws and Files, Gage Blocks and Surface Grinders

WOULD YOU LIKE A CONTOUR SAWING BOOK?

Send for a copy of this 265-page book of illustrated short cuts to faster and better machining. It's free.

PAGE for WIRE



With mills practically at capacity producing wire for war and for essential industry, users of wire find that there are many things that they can do to conserve essential materials.

SHAPED WIRE: Use standard shapes. That can be done easily. **PAGE** has a wide variety, including ovals, hexagon, octagon, square, channel, keystone, flat, half-round, etc.—in diameters to ⅜"—with end section areas to .250 square inch.

WELDING ELECTRODES: Be certain that electrodes are correct in analysis for the job. Lean toward larger sizes for economy. See that no excess metal is deposited in the weld and that your men use electrodes right down to the holder.

GENERAL WIRE: The situation in such products as Spring Wire, Bond Wire, Telephone Wire, etc., is not subject to early improvement. It continues to be important to check waste.

If **PAGE** experience can help you work out any of these details, we will be glad to cooperate.

PAGE STEEL AND WIRE DIVISION

Monessen, Pa., Atlanta, Chicago, Denver, Los Angeles, New York, Pittsburgh, San Francisco, Portland

In Business for Your Safety

AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT • CONNECTICUT

NEWS OF INDUSTRY

Reynolds Metals Co., Louisville, Ky.
Robert Tube Works, Detroit.
Superior Tube Co., Norristown, Pa.
United Wire & Supply Corp., Providence, R. I.
A. H. Wells Co., Waterbury, Conn.
Wolverine Tube Division (Calumet & Hecla), Detroit.

Sheet, Strip, and Plate

Product Codes
61—Sheet and plate
63—Strip

61, 62, Aluminum Co. of America, Chicago; Edgewater, N. J.; New Kensington, Pa.; Alcoa, Tenn.; Trentwood, Wash.
61, 62, Aluminum Goods Mfg. Co., Manitowoc, Wis.
61, 62, Aluminum Products Co., LaGrange, Ill.
61, 62, Fairmont Aluminum Co., Fairmont, W. Va.
62, Johnston Tin Foil & Metal Co., St. Louis.
61, 62, Sheet Aluminum Corp., Jackson, Mich.
61, 62, Reynolds Metals Co., Louisville, Ky.
61, Reynolds Metals Co., Listerhill, Ala.
61, 62, United Smelting & Aluminum, New Haven, Conn.

Foil

Aluminum Co. of America, Edgewater, N. J.; New Kensington, Pa.
Cochran Foil Co., Louisville, Ky.
Johnston Tin Foil & Metal Co., St. Louis.
Reynolds Metals Co., Glendale, N. Y.; Louisville, Ky.; Richmond, Va.
R. J. Reynolds Tobacco Co., Winston-Salem, N. C.

Large Castings Producers

(Excluded from this list are approximately 800 active smaller aluminum foundries)

Product Codes
71—Cylinder head sand castings
72—Other heat-treated sand castings
73—Non heat-treated sand castings
74—Heat-treated permanent mold castings
75—Non heat-treated permanent mold castings
76—Cold chamber die castings
77—Gooseneck die castings

72, 73, Acme Pattern & Tool Co., Dayton, Ohio.
72, 73, 74, 75, Advance Aluminum Castings Corp., Chicago.
71, 72, 74, Aluminum Alloys Corp., Detroit.
72, 74, 75, Aluminum Casting & Engineering, Milwaukee.
71, Aluminum Co. of America, Bridgeport, Conn.
71, 72, 73, 74, 75, Aluminum Co. of America, Cleveland.
71, 72, 73, 74, 75, Aluminum Co. of America, Detroit.
72, 73, 74, 75, Aluminum Co. of America, Fairfield, Conn.

"Old B. J. is trying to sell us on the idea of wearing an outfit like that to reduce absenteeism due to accidents!"

OIL DERMATITIS ELIMINATED!

A Proven, Scientific Formula Makes

TOOLIFE CUTTING BASE

Actually Germicidal!

WRITE US FOR DESCRIPTIVE BOOKLET AND FURTHER DETAILS ABOUT HOW TOOLIFE CUTTING OILS CAN ELIMINATE PRODUCTION LOSSES DUE TO DERMATITIS.

SPECIALTY

PRODUCTS COMPANY, INC.

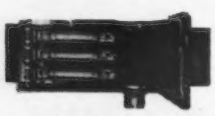
190 WARREN STREET • JERSEY CITY, N. J.

Manufacturers of Sulphur, Lard and Soluble Cutting Oils and Bases

Additional Territories Still Open to Sales Representative Write us at Once

Vacu-Break SAFETY SWITCHES. Streamlined, completely enclosed. Capacities: 30 Amp. to 600 Amp. inclusive; 2, 3, and 4 Pole, 600 Volts or less.

Vacu-Break COMPACT TYPE SWITCHBOARDS. Wall mounted, standardized unit sections, extremely flexible. Capacities: 2 and 3 Pole, 30 Amp. to 600 Amp. inclusive; 600 Volts or less; or 4 Pole solid neutral 230 Volts, A.C. Horsepower rated.



Vacu-Break BUS PLUGS for use on BullDog BUStribution DUCT. Fusible or non-fusible, quick make and break, horsepower rated. Capacities: 2 or 3 Pole, 30 Amp. to 600 Amp. inclusive; 600 Volts or less; or 4 Pole solid neutral 230 Volts, A.C.

BULLDOG *Vacu-Break* SWITCH PRINCIPLE *with "Clampmatic" contacts*

No electrical distribution system can be any better than its circuit protection devices. That's why BullDog has extended its famous Vacu-Break Safety Switch principle, with "Clampmatic" contacts, to cover not only individual safety switches, but panelboards, switchboards and bus plugs as well.

Now you are assured of faster, tighter closing of switching devices — of quicker, smoother operation — all along the distribution line.

The secret of tighter closing, the smoother operation, of "Clampmatic" contacts, lies in the wedging action of the movable contact "slug" against the beveled spring prongs of the stationary contact.

Ask your BullDog representative to show you a cut-away "Clampmatic" demonstrator. You won't believe, until you actually try it yourself, how tight the contacts are when closed, how smooth and easy the operation is.

After you try it, why not specify "Vacu-Break Clampmatic" for all your distribution devices whether safety switches, panelboards, switchboards or bus plugs.

BULLDOG *"Clampmatic"* PRINCIPLE OF *Vacu-Break* SAFETY SWITCH CONTACTS

Movement to OFF is speeded by release of static energy in clamping spring.

Formed bakelite cover (arcing chamber) removed from switch head to show action.

Instant, positive pressure contact caused by wedging action of moving contact when operating to ON position.

Full ON position. Moving contact now fits tightly between stationary Line and Load contacts under full clamping pressure of the spring.

BULLDOG ELECTRIC PRODUCTS CO.

Box 177, R. Pk. Annex
Detroit 32, Michigan

BullDog Electric Products of Canada, Ltd., Toronto, Ontario

Field Engineering Offices in All Principal Cities

MANUFACTURERS OF Vacu-Break Safety Switches, SafToFuse Panelboards, Circuit Master Breakers, Switchboards, Bus Duct Systems — FOR LIGHT AND POWER.

BUY MORE WAR BONDS

NEWS OF INDUSTRY

76, 77, Aluminum Co. of America, Garwood, N. J.
71, Aluminum Co. of America, Kansas City.
72, 73, 74, 75, Aluminum Co. of America, New Kensington, Pa.
71, 72, 73, 74, 75, Aluminum Co. of America, Vernon, Cal.
72, 74, Aluminum Industries, Inc., Cincinnati.
74, Arrow Head Steel Products Co., Howell, Mich.
72, 73, Atlas Pattern & Model Works, Brooklyn.
72, 73, Bendix Aviation Corp., Bendix Products Div., South Bend, Ind.
72, 73, Bendix Aviation Corp., Eclipse Pioneer Div., Teterboro, N. J.
72, 73, Blackhawk Foundry & Machine Co., Davenport, Iowa.
71, 72, 73, Bohn Aluminum & Brass Corp., Plant No. 2, Detroit.
74, 75, Bohn Aluminum & Brass Corp., Plant No. 3, Detroit.
73, 76, Cannon Mfg. Corp., Los Angeles.
72, 73, Capital Foundry Corp., Long Island City, N. Y.
71, Caterpillar Tractor Co., Peoria, Ill.
72, 73, 74, 75, Central Pattern & Foundry Co., Chicago.
74, Century Metalcraft Corp., Manufacturing Div., Los Angeles.
74, Chrysler Corp., Amplex Div., Detroit.
76, 77, Cleveland Hardware & Forging Co., Die Casting Div., Cleveland.
76, Die Cast Corp., Glendale, Cal.
74, 75, 76, Doehler Die Casting Co., Batavia, N. Y.
76, 77, Doehler Die Casting Co., Pottstown, Pa.
76, 77, Doehler Die Casting Co., Toledo, Ohio.
72, 73, 74, Ebaloy Foundries, Rockford, Ill.
76, 77, Electric Auto-Lite Co., Alemite Die Casting & Mfg. Div., Woodstock, Ill.
73, 75, Fairbanks, Morse & Co., Beloit, Wis.
71, 73, Ford Motor Co., Dearborn, Mich.
72, 73, General Bronze Corp., Long Island City, N. Y.
72, 73, General Electric Co., River Works, Schenectady, N. Y.
72, 73, General Malleable Corp., Werra Aluminum Div., Waukesha, Wis.
71, General Motors Corp., Buick Motors Div., Flint, Mich.
72, 74, General Motors Corp., Delco-Remy Div., Anderson, Ind.
72, General Motors Corp., Delco-Remy Div., Bedford, Ind.; Yellow Springs, Ohio.
72, 73, John Harsch Bronze & Aluminum Foundry Co., Cleveland.
76, Harvill Corp., Los Angeles.
76, 77, Hoover Co., No. Canton, Ohio.
71, 72, 73, Howard Foundry Co., Chicago.
72, 73, 74, Kinney Aluminum Co., Los Angeles.
72, 73, Light Alloys Mfg. Co., Painesville, Ohio.
76, Madison Kipp Corp., Madison, Wis.
72, 73, Maytag Co., Newton, Iowa.
71, 72, Metal Parts Corp., Racine, Wis.
72, 73, 74, 75, 76, Monarch Aluminum Mfg. Co., Cleveland.
71, 72, 73, National Aluminum Cylinder Head Co., Cleveland.
71, 72, National Foundry & Machine Co., St. Louis.
71, 72, 73, M. L. Oberdorfer Foundries, Inc., Syracuse, N. Y.
72, 73, R. H. Osbrink Mfg. Co., Los Angeles.
76, Outboard Marine & Mfg. Co., Johnson Motors Div., Waukegon, Ill.
72, 73, Packard Motor Co., Detroit.
76, 77, Paragon Die Casting Co., Chicago.
76, 77, Parker White Metal & Machine Co., Erie, Pa.
71, 72, 74, 75, Permold Co., Medina, Ohio.
72, 73, 74, 75, Reliable Pattern & Castings Co., Cincinnati.
76, 77, Precision Castings Co., Cleveland; Fayettville, N. Y.
76, Precision Castings Co., Syracuse, N. Y.
72, 73, Quality Aluminum Castings Co., Waukesha, Wis.
71, Servel, Inc., Evansville, Ind.
72, 73, Singer Mfg. Co., Elizabethport, N. J.
72, 73, Sperry Gyroscope Co., Brooklyn.
74, Sterling Aluminum Products, St. Louis.
76, Stewart Warner Corp., Stewart Die Casting Div., Bridgeport, Conn.
74, 75, 76, 77, Stewart Warner Corp., Stewart Die Casting Div., Chicago.
74, Thompson Products, Inc., Cleveland.
72, 73, Westinghouse Electric & Mfg. Co., Pittsburgh.
72, 73, 74, Wisconsin Aluminum Foundry, Inc., Manitowoc, Wis.
71, Wright Aeronautical Corp., Lockland, Ohio.
71, 72, 73, Wright Aeronautical Corp., Paterson, N. J.

Proper Grinding Perspective

Accuracy first . . then sensitivity, precision, high capacity, versatility, convenience. These virtues are quickly appreciated by both operator and management upon examination of any Thompson Grinder. For example: The control panel is inclined to a convenient angle for control of the hydraulic table movement and hydraulic head movement, both instantly variable. The micrometer stop above the elevating hand wheel is graduated in .0001" for close-tolerance grinding. Button control for the two speed motor and grinding wheel, with quick change from 1750 to 3450 rpm. Double length bed with no table overhang for greater accuracy. A knowledge and understanding of Thompson advantages will give the proper perspective for producing better grinding work—faster! Write to the Thompson Grinder Company, Springfield, Ohio.

Thompson
High Speed
Surface Grinder
Type F. 6" x 18"

Thompson

Anything like this
IN YOUR PLANT?

This copper tubular part, when cut in two, is used as a control bulb in the manufacture of essential refrigeration equipment.

By making bulbs in pairs, Wolverine now saves time and manpower and also enables the user to eliminate one cutting operation.

The ends of the bulbs are reduced by the Wolverine Patented Tube-spinning Process* and the pig tails of capillary tube are brazed into them.

Required for a definite purpose, this assembly was designed by the user in collaboration with Wolverine tube-fabricating engineers. All specifications are being met and the job is in production.

If this piece reminds you of a similar problem of yours involving tube or tubular parts, call Wolverine Tube Division for consultation and quotation. We have hundreds of standard tools already on hand for making parts and assemblies similar to the part shown here, along with a wealth of experience in handling seamless tube.

Or if you prefer to make the part yourself, call on Wolverine anyway as a source for tube that will be uniformly high in quality and possess the right properties for fabricating. Also consult our engineers regarding types of tools, methods, and techniques. Their talents and services are yours for no cost.

**Send for illustrated Catalog E-2 which describes many interesting applications of this new process.*

• *Our new address is Detroit 9, Mich.*

BUY WAR BONDS

CALUMET AND HECLA CONSOLIDATED COPPER COMPANY
WOLVERINE TUBE DIVISION
Seamless Copper — Brass
1441 CENTRAL AVENUE DETROIT, MICHIGAN

NEWS OF INDUSTRY

(Continued from page 138)

Magnesium Distributers

Adam Metal Supply Co., New York.
Brass & Copper Sales Co., St. Louis.
Central Steel & Wire Co., Chicago.
T. E. Conklin Brass & Copper Co., New York.
Henger-Seltzer Co., Los Angeles.
Metal Goods Corp., New Orleans; St. Louis; Kansas City; Houston, Tex.; Dallas, Tex.
New York Brass & Copper Co., Inc., New York.
Pacific Metal Co., Portland, Ore.
Pacific Metals Co., Ltd., Los Angeles; San Francisco.
Steel Sales Corp., Chicago; Detroit; Minneapolis; Milwaukee.
Strahs Aluminum Co., Inc., New York.
*Standard Rolling Mills, Brooklyn, N. Y.
J. M. Tull Metal & Supply Co., Atlanta, Ga.
Whitehead Metal Products Co., Inc., Cambridge, Mass.; Newark; Buffalo; New York; Philadelphia.
Williams & Co., Inc., Cincinnati; Cleveland; Columbus, Ohio; Pittsburgh.

*Distributes foil only.

Magnesium Producers

Amco Magnesium Corp., Wingdale, N. Y.
Basic Magnesium, Inc., Las Vegas, Nev.
Diamond Magnesium Co., Painesville, Ohio.
Dow Chemical Co., Freeport, Tex.; Midland, Mich.; Marysville, Mich.; Velasco, Tex.
Electro Metallurgical Co., Spokane, Wash.
Ford Motor Co., Dearborn, Mich.
International Minerals & Chemical Corp., Austin, Tex.
Magnesium Reduction Co., Luckey, Ohio.
Mathieson Alkali Works, Inc., Lake Charles, La.
New England Lime Co., Canaan, Conn.
Permanente Metals Corp., Manteca, Cal.; Permanente, Cal.

Secondary Ingot Producers

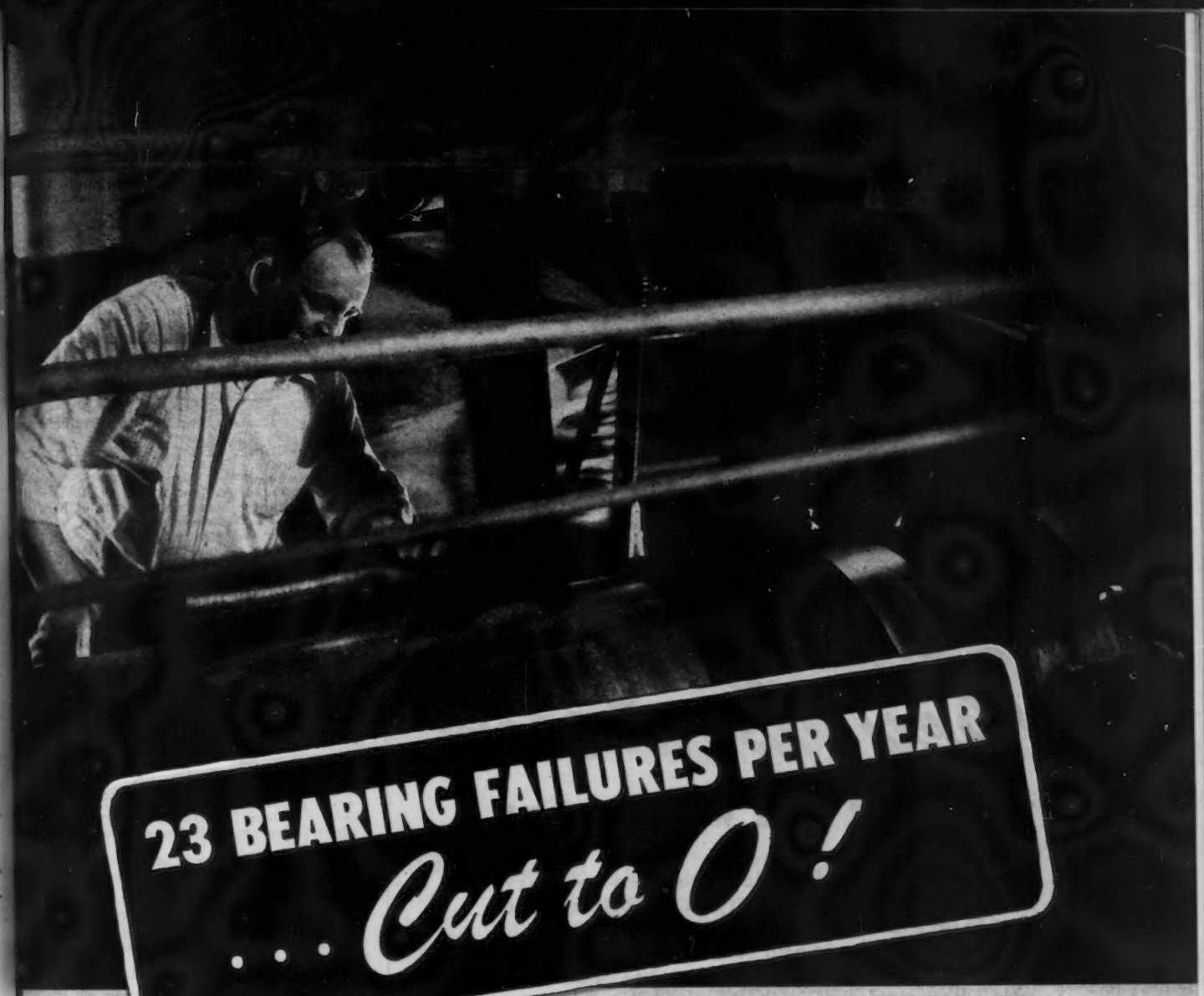
Aluminum and Magnesium Inc., Sandusky, Ohio.
Apex Smelting Co., Chicago.
Berg Metals Corp., Los Angeles.
Chevrolet Motor & Axle Division, GMC, Tonawanda, N. Y.
Federated Metals Division, American Smelting & Refining Co., Perth Amboy, N. J.
Gallagher Smelting Co., Oakland, Cal.
National Smelting Co., Cleveland.

Magnesium Fabricators

Sand Castings

Acme Aluminum Foundry Co., Chicago.
Aeroloy Co., Belleville, Ill.

LAST ONE: Army ordnance and members of the American Locomotive Co., Dunkirk, N. Y., honored the men of the plant when this final 155 mm. gun carriage rolled off the production line. Makers of the first 155 mm. gun carriage by private industry, the contract is now completed, and the company has returned to making locomotive parts.



23 BEARING FAILURES PER YEAR . . . Cut to 0!

SUN H.D. LUBRICANTS

eliminate costly bearing breakdowns . . . step up production

Machinery in rubber processing plants is going and must be kept going as never before. And here's how Sun's Doctors of Industry put a stop to 23 bearing failures per year.

The rolls on rubber mills were being operated under extreme pressures of as high as 70,000 pounds per square inch . . . as many as 43 rolls were renewed each year . . . and 23 of these replacements were traced directly to bearing failures. Then Sun Oil Engineers were called. A change was made to Sun No. 883 Grease and in the method of applying the lubricant.

Bearing failures were completely eliminated. Today the maintenance engineer estimates they are saving more than $4600 per year in the cost of bearings and rolls . . . plus a tremendous saving in production hours and lubrication maintenance.

Whatever the problems you have involving petroleum products—lubrication or processing—call in one of these Sun Doctors of Industry. They have gained a reputation for helping industry in the battle of production and always stand ready . . . willing . . . and able to aid you and your plant. Write . . .

SUN OIL COMPANY · *Philadelphia*

Sun Oil Company, Limited, Toronto, Canada

SUNOCO

SUN INDUSTRIAL PRODUCTS *HELPING INDUSTRY HELP AMERICA*

They also Serve

WHO FIGHT THIS WAR AT HOME

★ Frankly, we at Udylite have been too busy fighting this fight for Victory in our own remote way to do much bragging about it.

Udylite's products and services are practically unknown to the man on the street, the housewife or our boys and girls in the service.

In spite of this obscurity there are few pieces of fighting equipment today where metal finishing and corrosion resistance are necessary that have not benefited by the efforts of Udylite's army of employees—the years of intensive research for better methods and the high standard of dependability for which Udylite is known.

Udylite's men and women are part of this fight. The fruits of their labors are of vital importance to the fighting equipment of every branch of the service. Their knowledge and efforts have helped give our boys better fighting tools than the enemy.

To those of our customers who have so graciously "taken second" to vital government requirements on our services we extend our sincere thanks and the hope that we may soon again render them typical Udylite service.

L. K. Lidahl

PRESIDENT

THE UDYLITE CORPORATION

1651 East Grand Blvd., Detroit, Mich.

★ **OUR BOND QUOTA IS OVERSUBSCRIBED—IS YOURS?** ★

NEWS OF INDUSTRY

(Continued from Page 140)

Aircraft Foundry & Pattern Co., Grand Prairie, Tex.
Alloys Foundry, Inc., Wichita, Kans.
Aluminum Industries, Inc., Cincinnati, Ohio.
American Magnesium Corp., Cleveland; Buffalo; Bridgeport, Conn.; Vernon, Cal.
American Radiator & Standard Sanitary Corp., Elyria, Ohio; Louisville, Ky.
Bohn Aluminum & Brass Corp., Adrian, Mich.; Detroit; South Haven, Mich.
Capital Foundry Corp., Long Island City, N. Y.
Castalloy Co., Inc., Cambridge, Mass.
Central Pattern Co., Quincy, Ill.
Chevrolet Grey Iron Foundry Division, GMC, Saginaw, Mich.
John Deere Harvester Works, East Moline, Ill.
Detroit Magnesium & Aluminum Casting Co., Detroit.
Detroit Suburban Foundry Co., Birmingham, Mich.
Dodge Chicago Plant, Division Chrysler Corp., Chicago.
Dow Chemical Co., Bay City, Mich.
Ebaloy Foundries, Inc., Rockford, Ill.
Eclipse-Pioneer Foundries Division of Bendix Aviation Corp., Teterboro, N. J.
Ford Motor Co., Dearborn, Mich.
Fremont Flask Co., Fremont, Ohio.
Hills-McCanna Co., Chicago.
R. C. Hitchcock & Sons, Minneapolis.
Howard Foundry Co., Chicago.
Humphryes Mfg. Co., Mansfield, Ohio.
Light Metal Alloy Foundry, State College of Washington, Pullman, Wash.
Light Metals, Inc., Indianapolis.
Los Angeles Magnesium Casting Co., Los Angeles.
Magnesium Products, Inc., Los Angeles.
Marshall Stove Co., Lewisburg, Tenn.
Maryland Sanitary Mfg. Co., Baltimore.
Michigan Light Alloys Corp., Grand Rapids, Mich.
Midwestern Magnesium Co., Garrett, Ind.
R. H. Osbrink Mfg. Co., Los Angeles.
Permanente Metals Corp., Permanente, Cal.
Quality Castings Co., Orrville, Ohio.
Renown Stove Co., Owosso, Mich.
Rogers Bronze & Magnesium Foundry, Los Angeles.
Round Oak Co., Dowagiac, Mich.
Springfield Bronze & Aluminum Co., Springfield, Mass.
Superior Bearing Bronze Co., Inc., Brooklyn.
United States Radiator Corp., Geneva, N. Y.
Utica Radiator Corp., Utica, N. Y.
Wellman Bronze & Aluminum Co., Cleveland.
Wright Aeronautical Corp., Lockland, Ohio; Paterson, N. J.

Die Castings

American Magnesium Corp., Garwood, N. J.
Anderson Die Casting & Engineering Corp., Los Angeles.
Die Cast Corp., Glendale, Cal.
Doehler Die Casting Co., Batavia, N. Y.; Pottstown, Pa.; Toledo, Ohio.
Dow Chemical Co., Midland, Mich.
Fisher Body Division of GMC, Detroit.
Harvill Corp., Los Angeles.
New Products Corp., Benton Harbor, Mich.
Stewart Die Casting Div., Stewart Warner Corp., Chicago.
Universal Die Casting Co., Los Angeles.
Western Die Casting Co., Emeryville, Cal.

Permanent Mold Castings

Aluminum Industries, Inc., Cincinnati, Ohio.
American Magnesium Corp., Cleveland; Vernon, Cal.
Century Metalcraft Corp. Mfg. Div., Los Angeles.
Doehler Die Casting Co., Batavia, N. Y.
Dow Chemical Co., Bay City, Mich.
Dalmo Victor, Inc., San Francisco.
Metal-Mold Magnesium Corp., Cedarburg.
Vitreous Steel Products Co., Nappanee, Ind.
Kinney Aluminum Co., Los Angeles.

Extrusions

American Magnesium Corp, New Kensington, Pa.
Dow Chemical Co., Midland, Mich.
White Metal Rolling & Stamping Corp., Brooklyn.

Forgings

Bohn Aluminum & Brass Corp., Detroit.
Dow Chemical Co., Midland, Mich.
Revere Copper & Brass Co., Rome, N. Y.
White Metal Rolling & Stamping Corp., Brooklyn.
American Magnesium Corp., New Kensington, Pa.
Dow Chemical Co., Midland, Mich.
White Metal Rolling & Stamping Corp., Brooklyn.
Revere Copper & Brass Co., Baltimore.

Cutting production jobs down to size

You don't give a man a job today, and expect him to grow to meet it; you give the job a man, and whittle it down to his size.

W·A·B Controls on production machines and equipment help, by compensating for lack of physical strength, seasoned judgment, and long experience in new operators.

A whole cycle of operations can be governed by a few inches of travel of the small control handle. Safety features are inherent in the design. The operator can't set up two opposing actions, and so wreck the machine; the controls won't let him.

The operating mechanism can be designed to generate any desired force, according to the needs of the job. Fatigue is greatly lessened.

In graduating controls, precise agreement between the handle and the operating mechanism is obtained. This precision is not affected by time or wear.

You are probably giving a lot of thought—right now—to the improvement of products and production methods, to meet post war needs and post war competition. If a control problem is involved, the chances are excellent that W·A·B systems can help you. You'll find it profitable to include them in your planning.

Westinghouse Air Brake Company

INDUSTRIAL DIVISION

General Offices: Wilmerding, Pa.

74 Years of Pneumatic Control Experience

W·A·B

Pneumatic • Pneumatic-Electric • Pneumatic-Hydraulic

control systems

TORRINGTON
Force Feed Mechanical
LUBRICATOR

Positive, never-failing force-feed bearing lubrication. Design flexibility also enables power takeoff from machine to front, rear, side or bottom by rachet or rotary means. For complete information write, stating number of feeds and drive desired.

THE TORRINGTON
MANUFACTURING CO., TORRINGTON, CONN.

once upon a spring-time...

Springs as an aid to human comfort were the subject of ridicule in this magazine illustration published about 1850.

Today the furniture makers are but one of hundreds of industries utilizing some type of spring to make mankind less work or to give him greater comfort.

To fill the tremendous demand for an infinite variety of springs, the Torrington Spring Coiler and the professional springmaker make an excellent team.

The versatility of the Torrington Coiler and its ability to make accurate, uniform springs at high rates of production complement the experience and scientific skill of the springmaker.

No. 6 of a Series

THE TORRINGTON
MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT

Work . . . or Else Comes to Georgia

Moultrie, Ga.

• • • This city has outlawed loitering and has issued an ordinance requiring the citizens to carry cards showing where they work and during what hours in a drive to force all available manpower into jobs. The penalty for loitering in the streets without suitable work identification, or being caught loitering during regular working hours as an absentee is a short stretch in the hoosegow or a light fine. This ordinance is expected to be rigidly enforced for the duration.

Warehousemen Meet to Discuss War Time Industry Operations

Chicago

• • • With a program geared to a comprehensive study of industry operations under war time controls, steel warehousemen and mill representatives will convene at the annual meeting of the Steel Products Warehouse Association, Inc., at the Drake Hotel, Chicago, Nov. 19.

In addition to a session of detailed examination of problems and conditions affecting the distribution of steel warehouse products under WPB and OPA regulations, and a timely presentation on renegotiation proceedings by Philmore J. Haber, General Counsel of the Association, the program features an outstanding group of government officials speaking on manpower controls, CMP, warehouse regulations, price schedules, and steel redistribution.

T. S. Fitch, WPB Steel Division authority on the redistribution of surplus stocks, has been added to the previously announced list of afternoon speakers which included J. R. Stuart, Warehouse Branch, and others.

"It's all right, officer—my little son found me a short-cut to the factory!"

Official Signal Corps Photo

Sergeant Altimoso has himself a job

He's trying to remove rust from the huge pile of salvaged weapons collected from the jungle battlefields of New Guinea.

The sergeant may be able to put many of those rifles in usable condition, but the tropics aren't easy on metals. That's why Uncle Sam realizes he has another enemy to fight. Its name is RUST.

This fight starts back in the steel mill, down through the machining, the assembly, storage, shipping and the long delays awaiting invasion.

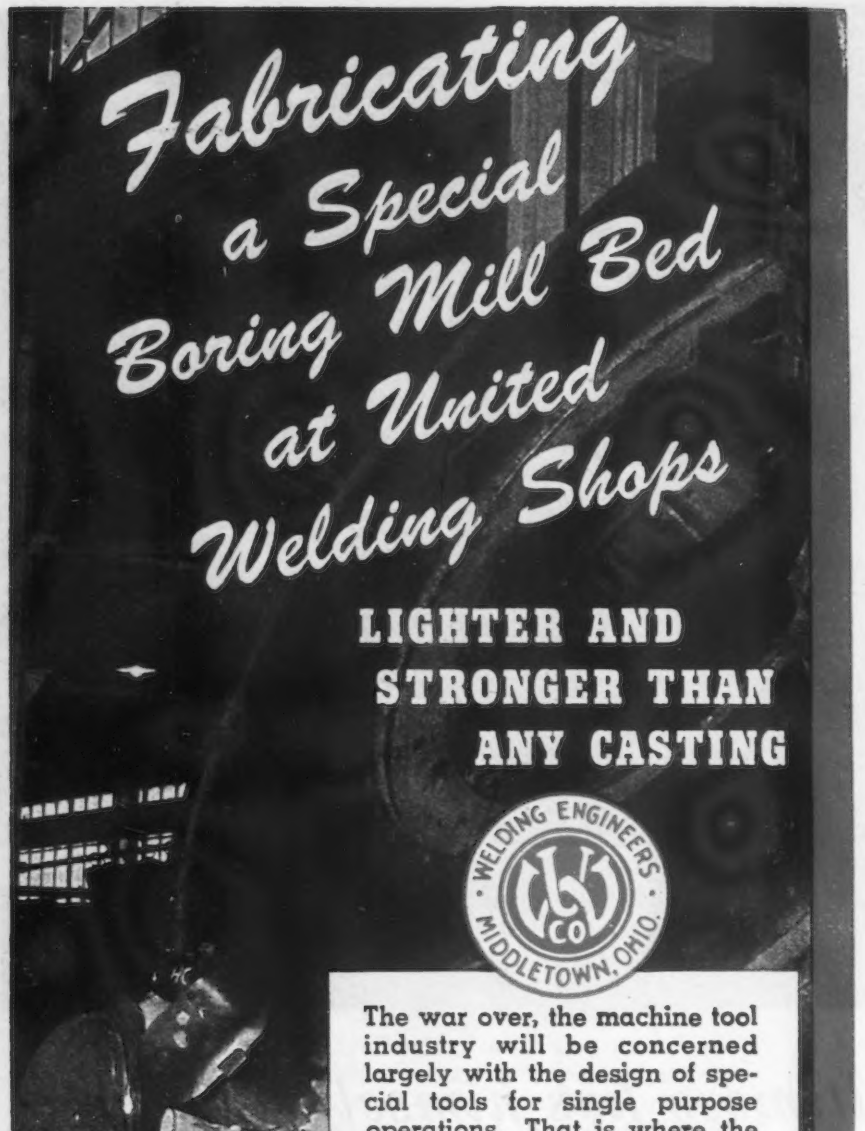
Specifications carefully worked out by the Army, Navy and Air Corps now cover almost all needs. But a rust preventive should do more than merely meet a "spec." It should be so made that it *exceeds* the protective minimum. Houghton rust preventives provide that "plus" service.

Whether it be a slush, or a light waxy film, or one which dries hard, or a heavy grease, you'll find a Houghton product ready to serve you well.

For Lend-Lease steel shipments, too, for which the A.I.S.I. has worked out rust preventive recommendations, the Houghton Man is ready to prescribe the correct Cosmoline or Rust Veto.

To the plant man concerned with rusting between operations, we can offer suggestions on the cleaning of steel surfaces prior to their protective coating. Write to E. F. Houghton & Co., Philadelphia, Chicago, Detroit, San Francisco or Toronto.

Houghton's RUST Preventives


Fabricating a Special Boring Mill Bed at United Welding Shops
LIGHTER AND STRONGER THAN ANY CASTING
WELDING ENGINEERS
UWCO
MIDDLETOWN, OHIO
ARMY
E
NAVY
THE UNITED WELDING CO.
MIDDLETOWN, OHIO
The war over, the machine tool industry will be concerned largely with the design of special tools for single purpose operations. That is where the welded steel fabricator comes in. He can form and weld the frame or housing, and various other parts, in the time it would ordinarily take to make patterns. And he can hold the cost down.
He will also produce the part faster and it will be lighter and stronger. Rounded corners that help style the unit, and many other contours that would puzzle the foundryman, can be produced with ease.
Arc welding is not "coming in". It is here. And United Welding has the equipment to cut, form, weld, anneal and sand blast parts up to many tons.
Submit your design. Your drawings and quantity required are all that is necessary.
WELDING FABRICATORS OF MODERN DESIGNS

Canada's Iron and Steel Production Off in September

Toronto

• • • **Declines were registered** in production figures of both pig iron and steel in Canada for the month of September, when blast furnaces maintained output at 75.5 per cent capacity compared with 84.2 per cent in August, while steel furnaces held production schedules for ingots and castings at 81.8 per cent from the 83.6 per cent in the previous month.

Twelve of the 13 blast furnaces were in production in September, with output of 147,902 net tons. For the nine months ending Sept. 30, pig iron production totalled 1,331,966 net tons, a decline of 9.9 per cent from the same period of 1942. Output of ferroalloys for September amounted to 17,007 tons compared with 18,429 tons in the previous month and 18,548 tons in September, 1942.

Production of steel ingots and castings for September amounted to 241,255 net tons, which compares with 246,820 tons in August and 244,922 tons in September last year. For the month, output included 229,700 tons of ingots and 11, 555 tons of castings. Production for the nine months ended Sept. 30, totalled 2,237,376 net tons.

At the end of September Canada's total rated pig iron capacity, not including the new stack recently completed at Sault Ste. Marie which has not yet blown in, was 2,348,160 net tons per annum. Total capacity for production of steel ingots and casting was 3,589,100 net tons a year.

DPC Contracts

Washington

• • • **Defense Plant Corp.**, RFC subsidiary, has authorized the following contracts:

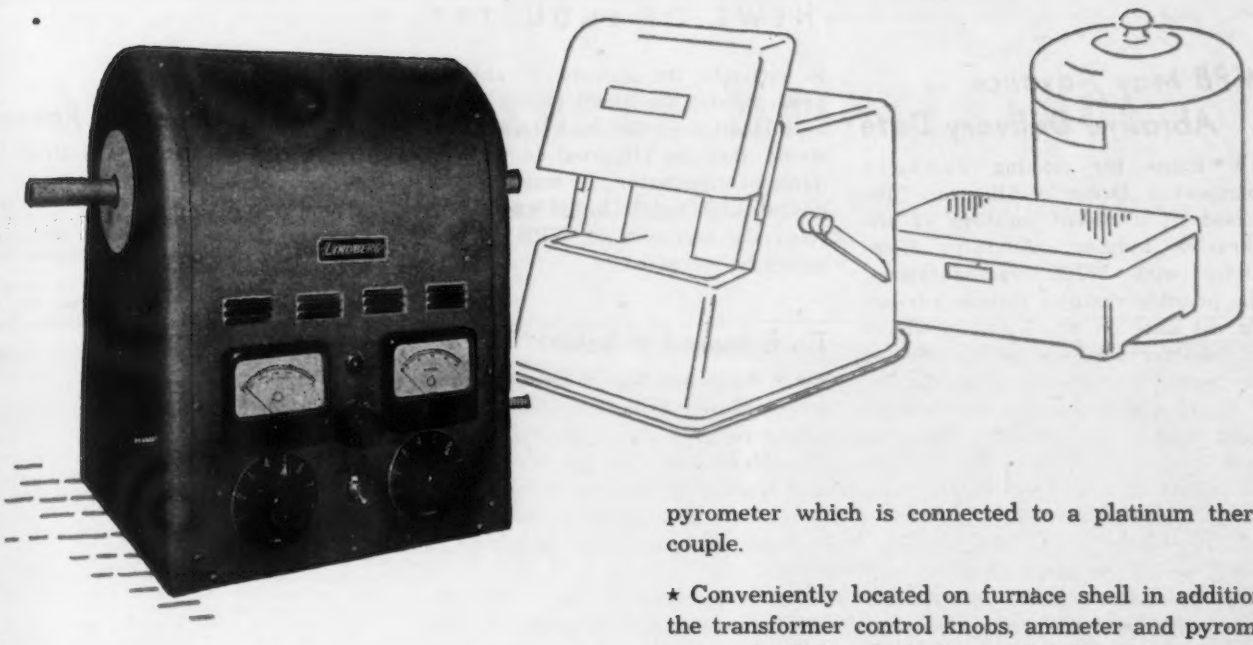
National Aluminum Cylinder Head Co., Cleveland, to provide additional facilities at a plant in Ohio at a cost in excess of $340,000,000, making a total commitment of more than $4,575,000.

Alan Wood Steel Co., Conshohocken, Pa., to provide additional facilities at a plant in New Jersey at a cost in excess of $875,000, making a total commitment of more than $3,950,000.

General Electric Co., Schenectady, to provide additional plant facilities in Ohio at a cost in excess of $275,000, making a total commitment of more than $3,800,000.

Standard Oil Co. of Louisiana, to provide additional facilities at a plant in Louisiana at a cost in excess of $125,000, making a total commitment of more than $1,740,000.

American Radiator and Standard Sanitary Corp., Pittsburgh to provide additional equipment at a plant in Kentucky at a cost in excess of $40,000, making a total commitment of more than $600,000.



Dependability

IN YOUR LABORATORY!

THE NEW LINDBERG LABORATORY FURNACES AND HOT PLATES are engineered for dependable performance and built for long life. In addition, they are designed to add to the high standard of present day laboratory cleanliness. Even the most fastidious technician will appreciate the modern streamlined appearance Lindberg equipment presents.

Pictured above is the Lindberg Combustion Tube Furnace. Let's glance over the many important features you can benefit by in your laboratory.

★ Because of the high temperatures obtainable, this furnace is ideal for fast modern volumetric methods of carbon or sulphur determination as well as gravimetric determination on carbon and all alloy steels, including stainless and heat resisting steels.

★ Three low voltage, high temperature Globar elements permit continuous operation with temperatures up to 2500°F. or for occasional operation to 2650°F. Heating elements are easily accessible—no inconvenient dismantling and assembling job required to replace them. Temperature is regulated by a built-in variable voltage transformer with coarse or fine adjustment for amperage control. Adjustment is made by merely making the necessary settings with the amperage control knobs.

★ An ammeter is provided to show the proper and safe current required for the Globar heating elements. The temperature in the combustion zone is indicated by a pyrometer which is connected to a platinum thermocouple.

★ Conveniently located on furnace shell in addition to the transformer control knobs, ammeter and pyrometer are a pilot light which shows when furnace is in operation; an on and off switch; and adjusting knob for controlling oxygen flow through a needle valve and rubber tubing adapters connected to the needle valve.

★ Furnace is equipped with adapters for easy interchangeability of tubes. Three sizes of tubes, 1", 1¼", and 1½" O.D. can be adpated, while fourth tube, 2" O.D., can be used without adapters.

★ For 60 cycle, AC current with voltage at either 110 or 220 volts. Furnaces for 25 cycle operation can also be supplied.

See your dealer today. He will be pleased to go over your requirements and point out the advantages you get with the new Lindberg Combustion Tube Furnaces, Box Furnaces, Crucible Furnaces and the new laboratory Hot Plates.

LINDBERG

Well-known Throughout the World as the Leaders in Developing and Manufacturing Industrial Heat Treating Equipment

ARMY NAVY

LINDBERG ENGINEERING COMPANY
2450 WEST HUBBARD STREET, CHICAGO 12, ILLINOIS

SOLD EXCLUSIVELY THROUGH LABORATORY EQUIPMENT DEALERS

WPB May Advance Abrasive Delivery Date

• • • **Plans for** making certain changes in Order M-319 were discussed at a recent meeting of the Abrasive Industry Advisory Committee with WPB representatives. The possible changes include advancing the date on which any producer or importer who desires to use, or any person who desires to accept, delivery of crude abrasive or abrasive grain makes application. The proposed new date would be the 15th of the second month preceding the two-month allocation period.

A suggestion for changing the allocation period on these abrasive materials from two to three months was discussed, but was not recommended by industry members because they said some consumers could not anticipate their needs for a three-month period.

It was suggested that instead of the present practice of setting aside material for small orders, each producer or distributor would be asked to estimate the amount of abrasive grain needed for small orders during an allocation period, and the material would then be allocated to the producer or distributor. It was also suggested that small order exemptions from the necessity of WPB authorization be increased.

•

Tin Released in Solder

• • • **WPB has issued General Preference Order M-43, as Amended, relaxing restrictions on the tin content of solders where it has been found that higher tin content is necessary. Previously this higher content could be used only upon the granting of appeal.**

But under the amended order specific provisions permit higher tin content, in some cases above 21 per cent, for certain solders, thus reducing paper work. Careful survey has shown that the higher tin content solders permitted will actually result in a saving of tin. The amended order also permits the reworking of block tin pipe.

Third Installment Of Seized Patents

(CONTINUED FROM PAGE 104)

Germany. 11-8-27.

(48) 2,123,683 Die press for shaping light metal sheets. Otto Oeckl, Germany. 7-12-38.

(48) 2,129,774. Draw press for production of hollow bodies from sheet metal plates. Otto Kuhner, Germany. 9-13-38.

(48) 2,245,723. Stretching press in which a sheet metal clamped in opposed vises may be shaped by a die secured to a die-table. Josef Salzmann, Germany. 6-17-41.

(48) 2,269,549. Drawing machine or die press for metal sheets. Otto Oeckl, Germany. 1-13-42.

(51) 1,830,647. Device for manufacturing supports for the arch of the foot. Theodor Engel, Germany. 11-3-31.

(51) 1,851,884. Device for cambering spring leaves, which is provided with suitable adjusting means for varying at will the radius of curvature. Tranquillo Zerbi, Italy. 3-29-32.

(54) 1,624,448. Support for the rolls of rolling mills of the type in which the rolls are not carried by supporting rolls but by bearings intermediate the main bearings of the rolls and journals of reduced diameter. Karl Ungerer, Germany. 4-12-27.

(54) 1,716,362. Straightening machine provided with rolls with headstock which permits withdrawal of the rolls in the axial direction. Peter Billingmann, Germany. 6-11-29.

(54) 1,800,023. Method and apparatus for bending metal strips between pairs of rolls. Johann Kozicz, Austria. 4-7-31.

(54) 1,856,937. Straightening and rolling machine. Karl Ungerer, Germany. 5-3-32.

(54) 1,857,325. Apparatus operated by hand for bending lines for toy railways. Friedrich Ottenstein, Germany. 5-10-32.

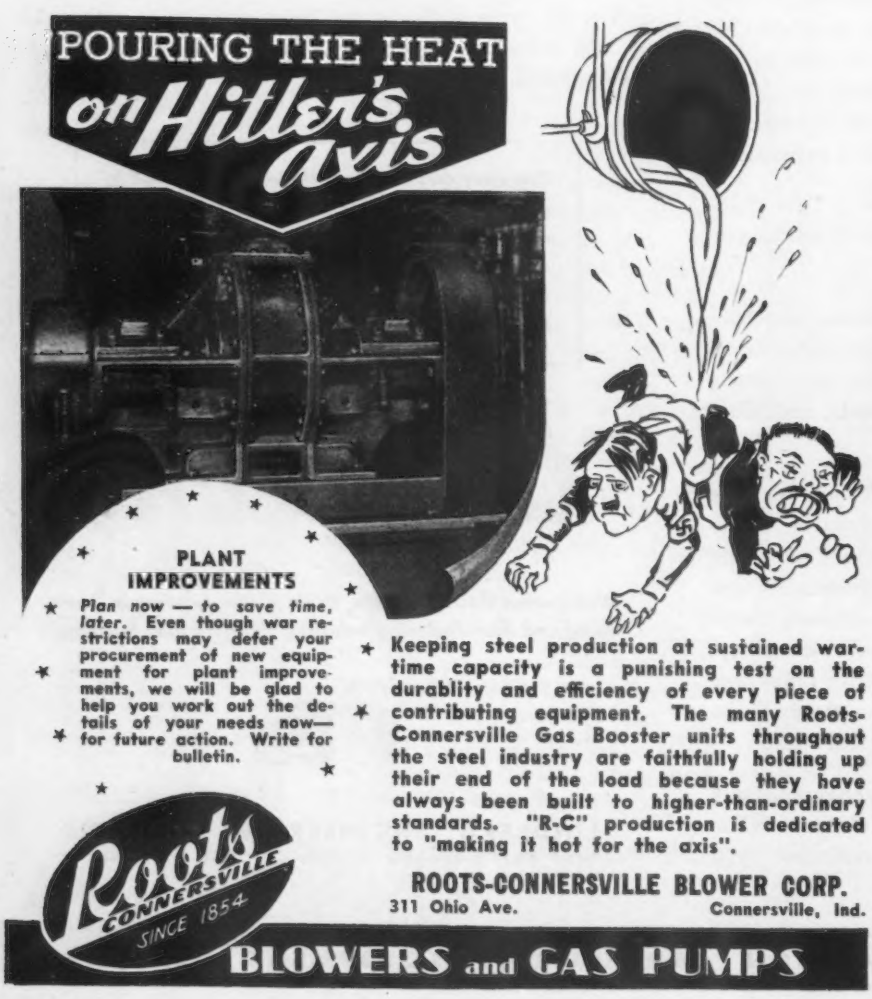
(54) 1,905,530. Adjusting device for plate straightening machines. Fritz Ungerer, Germany. 4-25-33.

(54) 1,943,153. Roller straightening machine in which the outer housing is movably arranged to permit exchanging the straightening rollers and the straightening roller shafts. Alfred Wirth, Germany. 1-9-34.

(1) 2,023,648. A sorting and setting machine for the manufacture of flexible metallic zip fasteners. Lucien, France. 12-10-35.

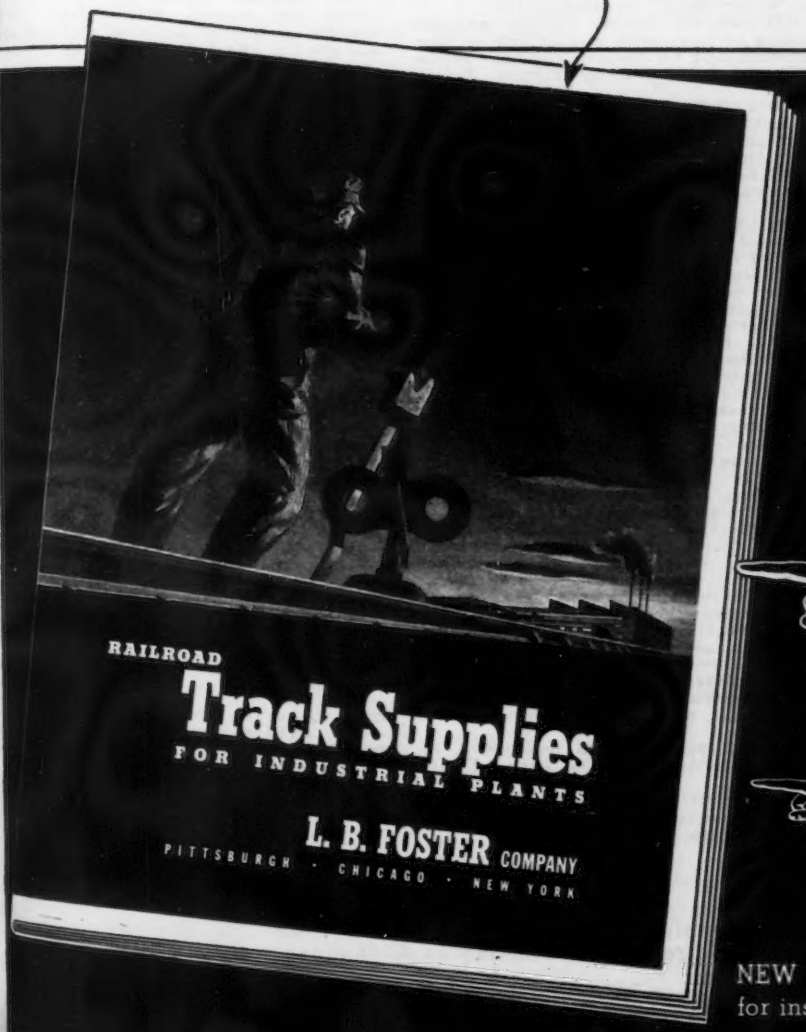
(1) 2,297,426. A device for the manufacture

PRAISE AND PRODUCTION: Col. J. J. Llewellin (right), British Cabinet member and Supply Council praised American war production and the two-stage, two-speed supercharger of the Packard-built Rolls-Royce aircraft engine. Shown holding the super-charger impeller is Packard's vice-president, W. M. Packer.


POURING THE HEAT
on Hitler's axis
PLANT IMPROVEMENTS
Plan now — to save time, later. Even though war restrictions may defer your procurement of new equipment for plant improvements, we will be glad to help you work out the details of your needs now—for future action. Write for bulletin.
Keeping steel production at sustained wartime capacity is a punishing test on the durability and efficiency of every piece of contributing equipment. The many Roots-Connersville Gas Booster units throughout the steel industry are faithfully holding up their end of the load because they have always been built to higher-than-ordinary standards. "R-C" production is dedicated to "making it hot for the axis".
Roots CONNERSVILLE SINCE 1854
ROOTS-CONNERSVILLE BLOWER CORP.
311 Ohio Ave. Connersville, Ind.
BLOWERS and GAS PUMPS

FOR YOUR TRACK MAINTENANCE

This new bulletin provides timely aid



- Angle Bars
- Bolts and Spikes
- Tie Plates
- Gauge Rods
- Frogs and Switches
- Switch Stands
- Car Stops
- Bumping Posts
- Derails
- Car Movers
- Rail Benders
- Track Jacks
- Track Tools
- Rail Data

NEW AND MODERN ACCESSORIES
for inside and outside trackage.

Your nearby Foster warehouse carries in stock all of the Rails and Track Accessories so essential to continuous and trouble-free haulage operations. The next time you need track supplies in a hurry—call Foster. Whatever you require, you'll get prompt and effective cooperation from an organization of track equipment specialists that has been serving the leading industrial plants for 44 years.

In the meantime—today—write to the nearest district office address below for your copy of the new Foster bulletin, "Railroad Track Supplies."

L. B. FOSTER COMPANY

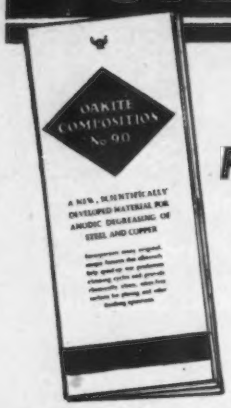
Pittsburgh 30, Pa.
P. O. Box 1647
Phone Walnut 3300

Chicago 4, Ill.
Continental Illinois Bank Bldg.
Phone Central 6759

New York 7, N. Y.
Park-Murray Bldg.
Phone Barclay 7-2111

WAREHOUSES: PITTSBURGH, PA., CHICAGO, ILL., BALTIMORE, MD., DELAWANNA, N. J., AMSTERDAM, N. Y.

ANODIC FASTER DEGREASING OF STEEL



SPEEDS PRODUCTION OF WAR SUPPLIES!

THIS NEW, 16-page data-filled Oakite instruction manual describes a fast, successful technique for speeding-up anodic or reverse current degreasing of steel and copper war parts before ALL electroplating and finishing operations.

It explains how a recently developed material . . . Oakite Composition No. 90 . . . QUICKLY and THOROUGHLY removes insoluble smut, grease, oil, buffing and polishing compounds, etc., giving you the chemically-clean, smut-free surfaces you want for stepped-up production schedules. The manual also describes how ten typical war plants are increasing output and securing better finishes by using FAST-WORKING Oakite Composition No. 90.

Instruction Manual *FREE!*

This NEW, specially prepared, illustrated manual is FREE on request. Write for YOUR copy TODAY . . . no obligation, of course!

OAKITE PRODUCTS, INC.
34E Thames St., New York 6, N. Y.
Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE *Specialized cleaning*
Buy Bonds for Victory
MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

of zippers in which the interengaging closing members provided with the inter-engaging feet are pressed by roller upon a roll-shaped cushion of a fabric band. Karl Wagele, Germany. 9-29-42.

(2) 2,196,619. Machine for striking tongues from the wall of a hollow body. Especially adapted for use in making connecting devices. Halvor Andresen, Norway. 4-9-40.

(25) 2,301,643. Apparatus for working sheet metal, particularly for edging or flanging. Ernst Sachse, Robert Korting, Hermann Wohlral, Walter Borstel, Germany. 9-10-42.

(32) 2,286,893. Process for the automatic bending of pipes made of cast iron or other materials, and for bending any cross section and thick plates. Pierre Boissou, France. 6-16-42.

(32) 2,292,731. Devices for shaping pieces, especially metal, by causing them to conform to shaping members or suitable curved pieces. Felix Amiot, France. 8-11-42.

(38) 1,863,693. Machine for bending, in the cold state, metal tubes. Cesar Mingori, France. 6-21-32.

(39) 1,639,289. Device for straightening nails and the like in which two fluted rollers are held in operating jaws whereby they can be pressed together. Henry W. Haegler, France. 8-16-27.

(48) 2,003,438. Tool for manufacture of metal cartridge shells having a double fold in the shell between the base and the tubular part of the shell, the crowns of said fold having a relatively large radius of curvature. Leon A. Guignet, France. 6-4-35.

(49) 1,849,054. Apparatus for manufacture, by bending in a press, of metallic tubes from a flat sheet. Pierre Boissou, France. 3-15-32.

(65) 2,006,389. Coiling device for production of stepped or compound torsion springs, composed of a plurality of coaxially disposed spiral springs of different diameters. Friedrich Fuchs, Czechoslovakia. 7-2-35.

(67) 1,690,452. Machine for manufacture of wire spiral which winds the wire spiral directly on the thread and cuts it in any length without cutting the thread. Jean Manent, Marius Manent, France. 11-6-28.

(73) 1,663,576. Apparatus for hot working metal; for use in manufacture of corrugated tubes. Waclaw von Kossowski, Poland. 3-27-28.

(73) 2,129,120. Method for manufacture of collapsible tubular extrusion containers which are made of metal. Charles Davis, France. 9-6-38.

(73) 2,183,304. Apparatus for forming extrusion containers. Charles Davis, France. 12-12-39.

(76) 2,040,929. Device for the formation of symmetric corrugations of thin sheet material. Byron Franghia, France. 5-19-36.

(78) 2,289,398. Machine for twisting a substantially endless wire adapted for use in the manufacture of drive screw nails and the like. Gunnar L. Whist, Norway. 7-14-42.

(79) 2,150,361. Methods of fixing hollow unions, ferrules and tubular rivets and apparatus for carrying out this method. Jacques Chobert, France. 3-14-39.

(81) 2,013,935. Machine for inserting and removing boiler tubes. Georges Wagner, France. 9-10-35.

(54) 2,018,400. Device for straightening plates, band material, flat material, profile material or wires of any cross sectional shape and the like. Karl Hack, Germany. 10-22-35.

(54) 2,049,142. Adjustable supporting device for the straightening rolls of plate straightening machines. Fritz Ungerer, Germany. 7-28-36.

(54) 2,185,481. Straightening machine which automatically displaces the ends of the straightening rolls in a direction opposite to the movement thereof at another point upon which pressure has been applied. Fritz Ungerer, Germany. 1-2-40.

(54) 2,213,507. Method and apparatus for straightening sheets and plates which has a roller leveler construction adapted for use as part of the straightening machine, or it can be used as an independent roller leveler unit. Fritz Ungerer, Germany. 9-3-40.

(59) 1,784,745. Means for effecting rotary operations in step presses. Ernst Nier, Germany. 12-9-30.

(59) 1,841,758. Machine for the manufacture of curled bendings at the longitudinal edges of metallic strips. Bruno Negrini, Italy. 1-19-32.

(63) 1,617,277. Method of bending thick-walled pipes by locally heating portions of the wall of the pipe which is to form the inner side of the bend and bending the pipe. Alfred Schmidt, Germany. 2-8-27.

(65) 2,248,440. Process and apparatus for the production of helical tension or draw springs of high initial tension. Otto Schmid, Germany. 7-8-41.

(66) 2,209,114. Apparatus for producing endless extended coil structures from wire or tape. Arnold Dorr, Germany. 7-23-40.

(67) 1,671,983. Tool for making a large range of sizes of coil, wire or pitch of either compression springs or tension springs. Carl Faust, Germany. 6-5-28.

(67) 2,164,679. Process and apparatus for manufacturing helices. Alfred Braun, Germany. 7-4-39.

(68) 1,704,326. Corrugated sheet metal shape for connection between corrugated or non-corrugated parts of a structure. Hugo Junkers, Germany. 3-5-29.

(Continued on Page 154)

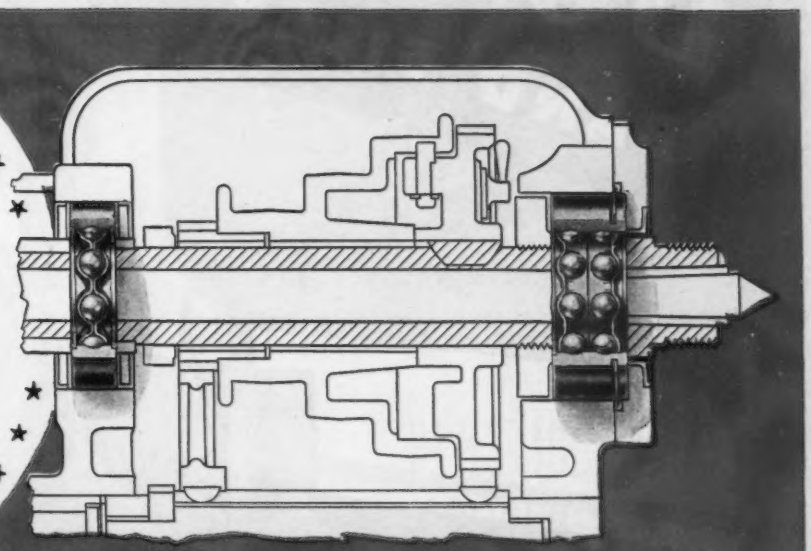
MINE DUMP: Allied forces advancing in Sicily near Roccepaluna found this huge dump of thousands of German teller-mines.

SUSTAINED *Spindle Accuracy!*

A FINER FEATURE OF LOGAN LATHES*

Brief SPECIFICATIONS

- Swing over bed 10½"
- Bed length 43⅛"
- Spindle hole 25/32"
- Precision ground ways: 2 prismatic "V" ways; 2 flat ways
- 12 spindle speeds—30 to 1450 per minute



NO. 200 BACK GEARED SCREW CUTTING LATHE

NO. 850 MANUFACTURING TURRET LATHE

NO. 820 QUICK CHANGE GEAR LATHE

Precision, Pre-Loaded Ball Bearing Headstock is Standard Equipment on All Models

Your purchase of a lathe is an investment. To be profitable, it should be a *long term* investment in speedy, accurate production. It will be if the lathe is a Logan, because Logan engineering designed it that way . . . throughout! For example, to assure sustained accuracy of the spindle, the headstock is equipped with special New Departure Ball Bearings. These bearings, of extreme precision, are pre-loaded so that the pressure of the cutting tool . . . either radial or thrust . . . causes a minimum deflection of the spindle. In addition to "pre-loading" . . . these ball bearings are grease sealed . . . requiring no lubrication and no adjustment for their entire life. Moreover, the higher operating speed of the Logan Lathe, due to its ball bearing spindle mounting, enables a shop to take every advantage of modern, high speed cutting methods. Production is increased and unit costs reduced.

Write for catalog sheets so that you can compare before you buy.

LOGAN ENGINEERING COMPANY
CHICAGO 30, ILLINOIS

Logan

A NAME TO REMEMBER WHEN YOU THINK OF LATHES

*This advertisement is one of a series describing the finer features of Logan Lathes . . . Look for the next of the series

DoALL BAND FILER

Cuts all the time

NO STOP —NO DRAG

SPEEDMASTER 100% variable control fits file speed to work at any point between 50 and 250 feet per minute.

DoALL Band Filer, is a complete, self-contained unit—delivered ready for immediate service.

Band filing, like band sawing, is *continuous*—without stop and drag back. *All* of the action is *cutting* action, because the file teeth move only in cutting direction.

The resultant speed is amazing! Four times faster than reciprocal machine filing—nine times faster than hand filing! *Plus* smooth cut internal or external finishes, *file-broached* to tolerances beyond .001"—precision without experience, without fatigue.

Investigate the tremendous advantages of DoALL Band Filing in production, tooling and maintenance work—on all metals, wood, fibre and plastics. There is a DoALL Sales Office near you—telephone now!

FREE: The services of the DoALL File Engineering Laboratory—bring or send your filing problem.

Contour Machines

The Zephyr

Band Filer

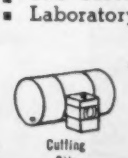
Surface Grinders

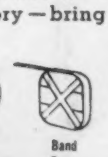
Magnetic Chucks and Selectron

Variable Speed Pulleys

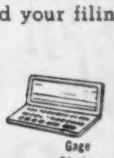
Dust Collectors, Coolant Systems

Grinding Wheels


Cutting Oils


Band Saws

Band Files


Gage Blocks

Gage Instruments

DoALL SALES OFFICES IN PRINCIPAL CITIES

BAND FILER *Made by* CONTINENTAL MACHINES, INC. *Address Inquiries to* 1301 S. Washington Ave., Minneapolis 4, Minn.

INDUSTRY'S NEW SET OF TOOLS SOLD AND SERVICED BY 34 DoALL OFFICES

METAL SPECIALTY

fulfilling exacting requirements for

INDUSTRY

in

PLASTIC MOLDING

and

METAL WORKING

Drawing · Coining
Rolling · Forming
Stamping · Welding

Metal Specialty's plants are equipped to render you complete service in the fabrication of all Metal Parts, and in Plastic Injection Molding up through 18 ounces per shot. Along with 850-ton self-contained hydraulic presses for Metal Working, Metal Specialty has one of the four 18-36 ounce capacity injection presses for Custom Molding together with full complementary equipment.

Assembled Jobs · Pressed Metal to Order

ARMY E NAVY

The
METAL SPECIALTY *Co.*
MAIN OFFICE AND PLANT • ESTE AVENUE • CINCINNATI, OHIO

(Continued from Page 150)

(69) 1,898,070. Apparatus for making water drums of water tube boilers. Max Ulrich, Germany. 2-21-33.

(69) 1,931,242. Apparatus for making headers for water tube boilers. Max Ulrich, Germany. 10-17-33.

(73) 1,605,194. Machine by which flexible metal pipes can be manufactured from metal tubes provided with undulated walls, the undulations being jumped up whereby the previously rigid tube is converted into a flexible pipe. Carl Kopf, Germany. 11-2-26.

(77) 1,899,225. Apparatus for rolling annular ribs and corrugations into the walls of sheet metal containers or the like. Josef Bahner, Germany. 2-28-33.

(78) 2,216,758. Twisting reinforcements for concrete. Rudolf Schmidt, Austria. 10-8-40.

(79) 2,088,131. Means for expanding hollow bodies, particularly the stay bolts of the fire boxes of locomotives. Walter Cambeis, Germany. 7-27-37.

(82) 1,752,408. Tube expander. Otto Zein, Germany. 4-1-30.

(82) 1,793,624. Device for fastening tubes in boiler walls, flanges, plates, etc., by expansion. Josef Lang, Germany. 2-24-31.

(162) 1,794,575. Controlling means for plunger pumps. Senatore Borletti, Italy. 3-3-31.

Class 305—Land Vehicles, Wheel Substitutes

(10) 1,684,918. Chain track for motor vehicles, especially a track in which the chain links can adjust themselves relatively to one another in a transverse plane. Viktor Jereczek, Germany. 9-18-28.

(10) 1,982,468. Endless track for vehicles particularly suitable for use in connection with smaller vehicles such as wheelbarrows and the like. Ottokar Drapal, Austria. 11-27-34.

(10) 1,869,290. Endless traction belt such as are employed as the traction means for endless belt tractors and vehicles. Richard Venzlaff, Germany, 7-26-32.

(13) 1,620,460. Traction device for vehicle wheels. Luigi Guerrini, Italy. 3-8-27.

(10) 1,621,371. Removable creeper device for tough treads of mechanical vehicles. Adolphe Kegresse, France. 3-15-27.

(10) 1,627,287. Endless supporting and driving flexible belt for motor and other vehicles. Adolphe Kegresse, France. 5-3-27.

(7) 1,634,589. Tire protector of the type in which the wheel rolls within an annular outer tire whose diameter is larger than that of the wheel. Lucien Lotte, France. 7-5-27.

(10) 1,695,657. Traction increasing device for endless flexible track belts. Adolphe Kegresse, France. 12-18-28.

(11) 1,744,569. Apparatus for the transportation of loads, which can be employed either singly or in groups. Henri Bordes-Pages, France. 1-21-30.

(13) 1,754,569. Traction device for wheels of vehicles, especially for tractors. Carlo Passega, France. 4-15-30.

(10) 1,773,534. Flexible endless track belt for motor vehicles. Adolphe Kegresse, France. 8-19-30.

(9) 1,786,430. Endless track vehicle. Adolphe Kegresse, France. 12-30-30.

(10) 1,786,539. Metal and rubber track belt in which two endless strips form the body of the belt and provide for its traction without being subjected to the action of the rollers. Adolphe Kegresse, France. 12-30-30.

(10) 1,790,098. Resilient track with movable elements. Adolphe Kegresse, France. 1-27-31.

(9) 1,802,656. Endless track vehicle. Adolphe Kegresse, France. 4-28-31.

(9) 1,831,012. Power driven field auto of the crawler type. Ernst Kornbeck, Denmark. 11-10-31.

(9) 1,910,798. Device for elastically adjusting the roller bogies on the load carrying main equalizer in endless track vehicles. Adolphe Kegresse, France. 5-23-33.

(9) 1,922,768. Endless track vehicle arranged with driving pulley as close to the ground as possible without, however, a permanent contact therewith. Adolphe Kegresse. France. 8-15-33.

(9) 1,959,477. Tread train for an endless band vehicle. Adolphe Kegresse, France. 5-22-34.

(9) 1,975,725. Endless track vehicle. Leon Martinage, France. 10-2-34.

(9) 1,975,726. Endless band track for all vehicles drawn mechanically or by animals for mechanical conveyors or other uses, which is rigid in one direction and flexible in the other. Leon Martinage, France. 10-2-34.

(9) 1,980,276. Endless strip driving gear of reduced dimensions, having at the same time as great a surface contact with the ground as possible. Adolphe Kegresse, France. 11-13-34.

(6) 1,989,321. Traction device which avoids traction disadvantages existing in lorries or other vehicles on soft or uneven ground. Auguste Laize, France. 1-29-35.

(10) 2,022,567. Section belt for the tracks of endless track vehicles and provides for the ready dismantling or interchanging of the elements of the tire. Adolphe Kegresse, France. 11-26-35.

(10) 2,023,737. Method of construction and arrangement of endless track which will make for simplicity. Leon Martinage, France. 12-10-35.

(8) 2,101,618. Endless track for vehicles. Adolphe Kegresse, France. 12-7-37.

(9) 2,111,475. Flexible mounting for carrying rollers on vehicles. Adolphe Kegresse, France. 3-15-38.

(10) 2,113,504. Method for assembling the links of endless chains. Louis Caute, France. 4-5-38.

(10) 2,116,834. Endless track for vehicles. Adolphe Kegresse, France. 5-10-38.

(9) 2,116,835. Method of providing flexible joints in endless track vehicles, which require no maintenance, are silent, and allow a limited stroke or movement. Adolphe Kegresse, France. 5-10-38.

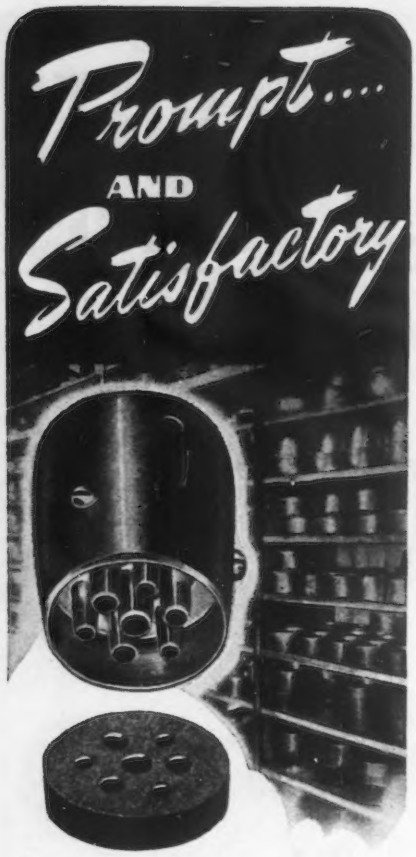
(10) 2,120,753. Silencing device for endless track vehicles. Adolphe Kegresse, France. 6-14-38.

(10) 2,230,935. Endless chain of the caterpillar type. Lucien Chevreau, France. 2-4-41.

(9) 2,297,485. Means of driving and supporting the caterpillar tractor. Anton Lenta, Germany. 9-29-42.

(Continued on Page 158)

A JEEP GOES TO SEA: The versatile little car is now proving its usefulness to the Navy. On an aircraft carrier the "all purpose" car pulls a torpedo bomber into position on the flight deck as crewmen take over to prepare the plane for the attack on Wake Island.



IT IS gratifying to obtain prompt shipment of materials and parts! Even more so, if they exactly suit your purpose. This double achievement is routine occurrence at plants where Booth "prescription" felts — precision die-cut to specifications — are overcoming critical material shortages. Aircraft and other vital war industries thus bypass many a production problem!

THE BOOTH FELT COMPANY
477 19th Street Brooklyn, N. Y.
747 Sherman Street Chicago, Ill.

APPLICATION CHART AND SAMPLE KIT . . . Contains swatches of S.A.E. felt types, with specification tables. Write for it. (No sales follow-up.)

2070

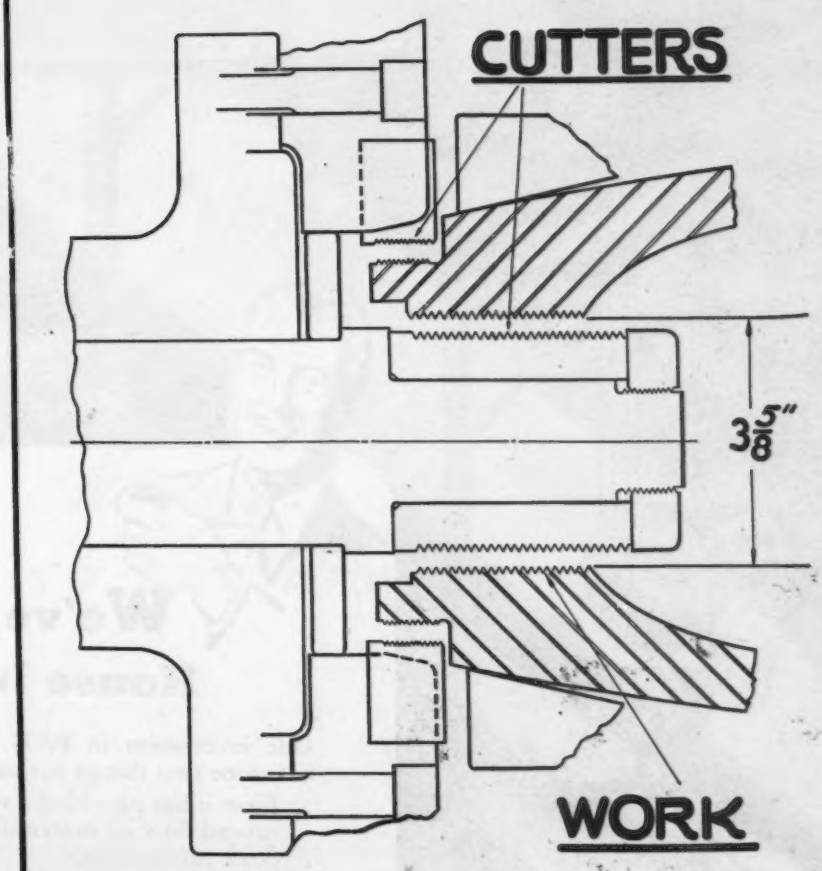
Booth
TRADE MARK

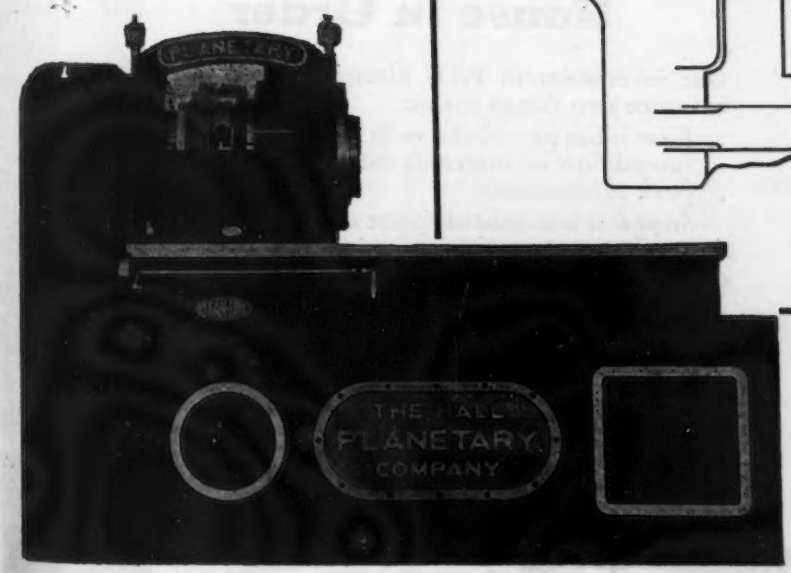
PRECISION CUT FELT PARTS

MILLING TWO THREADS OF DIFFERENT PITCHES SIMULTANEOUSLY IN THE NOSE OF A LARGE SHELL

MACHINE: **THE HALL PLANETARY**

Floor-to-floor Time is 5 Minutes





Complete Details Upon Request

HALL PLANETARY COMPANY

Fox Street and Abbotsford Road, Philadelphia, Pa.

We've put our House in Order

Our investment in P&H Electric Cranes has done two things for us:

First: it has provided a swift, uninterrupted flow of materials for today's peak production.

Second: it has assured lower cost for years after the war is over.

Our P&H Electric Cranes will serve as long as the buildings that house them.

P&H is America's largest and only crane builder producing complete electrical crane equipment.

General Offices: 4401 West National Ave., Milwaukee, Wis.

HARNISCHFEGER
CORPORATION
ELECTRIC CRANES • EXCAVATORS • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

P&H
OVERHEAD CRANES

Design change?

HERE'S HOW TO GET NEW STEELS FAST!

When a sudden change in design requires new steels, of which you have none on hand —you can still "change over" months sooner by filling in from warehouse stocks.

Frasse stocks, for example, are now fairly well rounded — and are immediately available to carry production loads until mill shipment is made. Emergency quantities of cold finished bars, tubing, stainless steels, alloy and aircraft steels and tubing can be shipped while your mill order is still awaiting scheduling.

On "tap", too, are Frasse technicians to help you get maximum benefit from Frasse stocks — experienced counsel in substituting, switching and scheduling. Frasse steels and technical men have "stopgapped" scores of changeovers until mill shipments could roll. Call on them. *Peter A. Frasse and Co., Inc., Grand St. at Sixth Ave., New York 13, N. Y. (Walker 5-2200) • 3911 Wissahickon Ave., Philadelphia 29, Pa. (Radcliff 7100-Park 5541) • 50 Exchange St., Buffalo 3, N. Y. (Washington 2000) • Jersey City, Hartford, Rochester, Syracuse.*

Frasse

Mechanical and Aircraft STEELS

SEAMLESS MECHANICAL AND AIRCRAFT TUBING · COLD FINISHED BARS · ALLOY STEELS · AIRCRAFT STEELS
STAINLESS STEELS AND TUBING · DRILL ROD · COLD ROLLED STRIP AND SHEETS · WELDED STEEL TUBING

for **MAGNETIC EQUIPMENT**

to SPEED Production

Consult

Stearns **MAGNETIC**

Stearns Drill Stand Magnet

The STEARNS Drill Stand Magnet, a profitable investment for steel and iron fabricators. Provides greater accuracy in drilling, saw hole cutting, etc. . . . increases operator output with less fatigue. Fits any standard old man stand, easily attached, holds with tenacious grip in any position. Will cut your fabricating costs. STEARNS Holding Magnet or Magnetic Clamp holds plates in alignment for lap welding quickly, safely, economically, a difficult job made easy. Feel free to consult us on fabricating problems. We may be able to help you get smoother, faster production.

Stearns Holding Magnet

Lifting Magnets

STEARNS MAGNETIC MANUFACTURING CO.

635 S. 28th St. Milwaukee, Wis.

(Continued from Page 154)

Class 51—Abrading

(2) 1,909,586. Polishing machine in which the pulverulent particles to be provided with a luster are worked by means of brushes rotating in a cylindrical drum. E. Kramer, Germany. 5-16-33.

(2) 1,930,683. Polishing machine for colored pulverulent bronze which produces a luster from the delicate metal foils. E. Kramer, Germany. 10-17-33.

(9) 1,996,885. Centrifugal device for throwing abrasives which reduces the interruption of the supply stream to a minimum. W. Schemmann and F. Kottmann, Germany. 4-9-35.

(9) 2,224,647. Sand centrifuging cleaning machine for use in foundries and other works. K. Grocholl, Germany. 12-10-40.

(9) 2,267,018. Apparatus for cleaning castings and the like wherein the article is cleaned by flinging on to it, by means of a rotating impeller, an abrasive such as sand. F. Eckler and R. Rugge, Germany. 12-23-41.

(11) 1,729,577. Blast nozzle for blowing apparatus in which solid materials such as sand, steel balls, concrete masses, metal and the like are sprayed by the suction of a compressed fluid. F. Gastell, Germany. 9-24-29.

(11) 2,110,634. Sand blast nozzle having a jacket and a hard liner concentrically arranged therein, characterized by the fact that the hard liner is attached in the rubber layer by frictional contact. A. Rehmann, Germany. 3-8-38.

(14) 1,952,848. Method of and apparatus for treating the inner surface of tubular bodies with blasts. W. Eckler, Germany. 3-27-34.

(26) 1,948,071. Method and equipment for lapping spur-helical and internal gears. F. Hofmann and F. Rohl, Germany. 2-20-34.

(26) 1,966,172. Method of and apparatus for lapping gears. H. Jackowsky, Germany. 7-10-34.

(28) 1,915,195. Method of and machine for grinding in valves and cocks. K. Martin, Germany. 6-20-33.

(31) 2,169,841. Device for polishing spiral elongated grooves situated upon the inner walls of a hollow body. F. Hollstin, Germany. 8-15-39.

(33) 2,003,883. Device for spherical grinding of circular grinding machine. J. Grundstein, Germany. 6-4-35.

(28) 1,893,657. Device for simultaneously opening a plurality of valves with the aid of a like number of diaphragms forming the end walls of a common compartment and a device for changing the pressure in this space. C. Schaefer, Germany. 1-10-33.

(34) 1,685,757. Circular grinding machine designed to impart an axial to-and-fro movement of small amplitude to the grinding disc or wheel. W. Storck, Germany. 9-25-28.

(34) 1,886,025. Twist drill grinding machine consisting of non-uniform profiles in surfaces of twist and other drills. V. Jereczek, Germany. 11-1-32.

(34) 1,976,233. Grinding machine for grinding natural and artificial stones. W. Kosfeld, Germany. 10-9-34.

(34) 2,115,461. Polishing machine for producing smooth and accurately true cylindrical surfaces. E. Hartmann, Germany. 4-26-38.

(40) 1,772,721. Grinding machine for finishing borings. K. Jung, Germany. 8-12-30.

(45) 2,027,621. Method of and machine for producing hob cutters. H. Schict, Germany. 1-14-36.

(46) 1,817,405. Production of cycloidal curves. L. Braren, Germany. 8-4-31.

(48) 1,646,375. Machine for automatically cutting facets in staggered rows into the surfaces of articles made from amber, etc. W. Augenstein, Germany. 10-18-27.

(49) 1,808,392. Apparatus for grinding rolls, and more particularly for setting the roll being ground in its bearings. O. Waldrich, Germany. 6-2-31.

(50) 1,822,222. Interior grinding machine for grinding out bores accurately. K. Jung, Germany. 9-8-31.

(50) 1,875,163. Cutter grinder comprising a carriage, a chuck on said carriage for holding a cutter, means for rotating said chuck and for feeding-in said carriage. W. Scharf, Germany. 8-30-32.

(54) 1,929,639. Device for grinding and polishing cylinders more particularly copper or copper covered intaglio cylinders. F. Kettlein, Germany. 10-10-33.

(55) 1,857,549. Grinding machine for grinding drills in which the grinding wheel, for the purpose of zone displacement, is moved from its front face past the pivotal clamping head ing holding the twist drill, on a pivot located thereunder. V. Jereczek, Germany. 5-1-32.

(56) 2,136,266. Teeth generating machine for making gear wheels. E. Reinecker, Germany. 11-8-38.

(56) 2,207,018. Machine for grinding gear teeth by the generating process. F. Linse, Germany. 7-9-40.

(57) 1,719,964. Grinding machine for grinding round blanks, rollers or rolls. P. Bruhl, Germany. 7-9-29.

(57) 1,719,965. Grinding machine in which the blanks, rollers or balls are successively fed through a passage or passages defined in a pair of grinding plates. P. Bruhl, Germany. 7-9-29.

(60) 1,953,212. Device for sharpening reamers by means of reciprocating files. K. Bier, Germany. 4-3-34.

(62) 1,855,178. Die lapping and grinding machine of the kind in which the lapping or grinding tool consists of a wire. R. Bstel, Austria. 11-1-32.

(65) 1,973,739. Automatic electric device for sharpening blades of any kind, particularly razor blades. U. Allioni and N. Coen, Italy. 9-18-34.

(67) 1,638,082. Grinding machine for the finish grinding of parts having parallel flat faces such as gauge blocks, the side faces of rings for ball bearings, etc., or curved surfaces such as balls and rollers. P. Bruhl, Germany. 8-9-27.

(71) 1,627,704. Bristle-pointing device comprising a rotatable wheel, a plurality of pins extending radially from the periphery of said wheel, and an abrading material secured from the surfaces of said pins. Riichiro Izawa, Japan. 5-1-27.

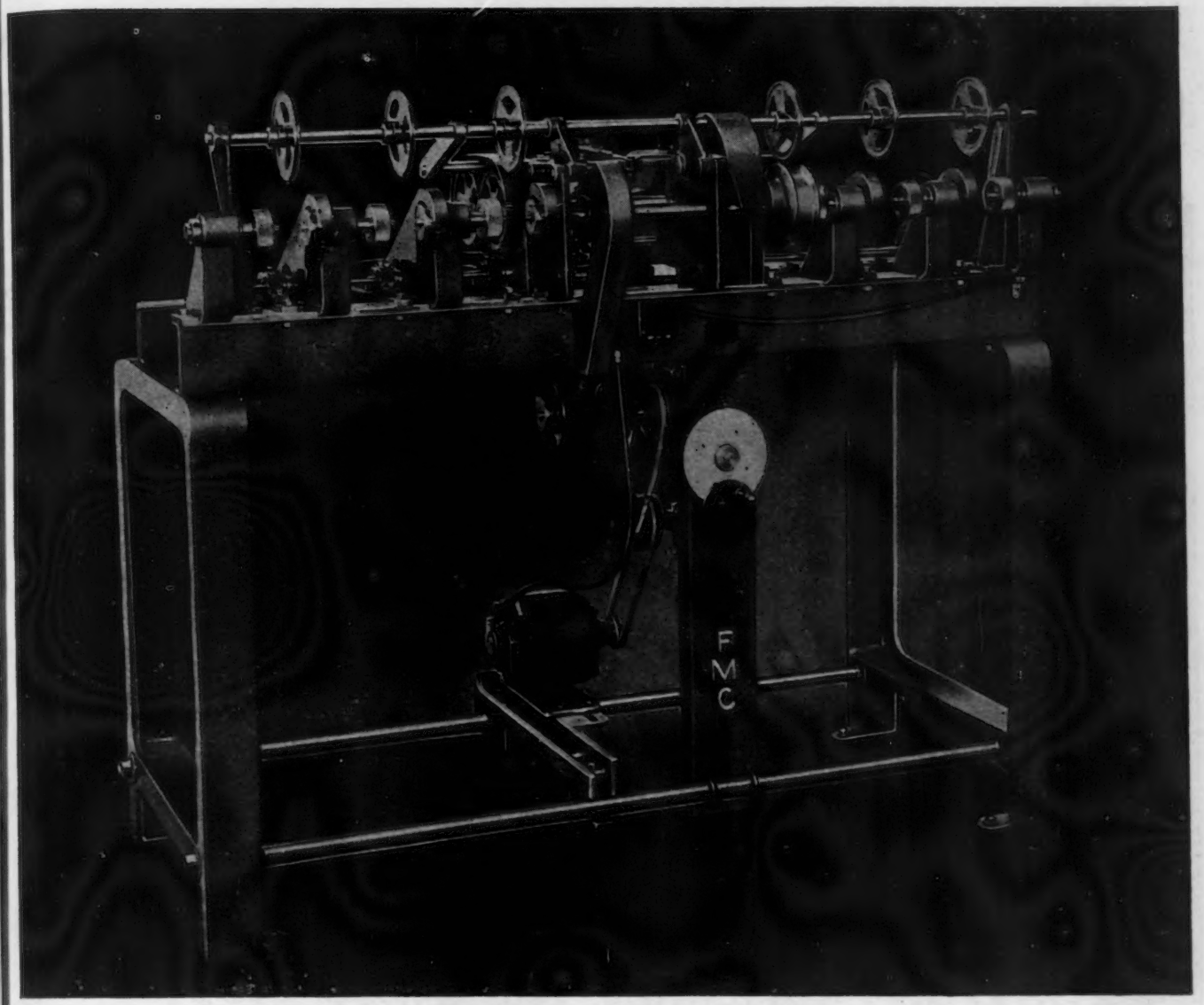
(73) 1,842,009. Machine tool driven by an electric motor for use where cylindrical or round work-pieces are to be worked on. W. Brasch, Germany. 1-19-32.

(76) 1,705,767. Automatic device for pointing bristles of brushes. Riichiro Izawa, Japan. 3-19-29.

(81) 1,983,214. Apparatus for grinding and stropping hollow ground razor blades. L. Brylski, Germany. 12-4-34.

(85) 1,641,074. Device for sharpening two-

BATTLESHIP X: General Electric Co. employees get a great kick out of reading about the exploits of Battleship X, now identified as the U. S. S. South Dakota, credited with sinking five Jap warships and destroying 32 Jap planes. Admiral Woodward told G-E workers, "Your turbines and gears propelled the South Dakota."



Another FIDELITY Machine—
both a pacemaker and a peacemaker

—a pacemaker for production and a peacemaker for performance and delivery.

Illustrated is one of a number of types of FIDELITY Wire Spoolers which take care of an unusually wide range of wire winding requirements on spools, sticks, reels or quills.

FIDELITY Wire Spoolers deliver a smooth, uniform lay at speeds from 40 to 800 feet per minute—depending on kind and size of wire.

For tapered, wedge-end, or barrel-shaped packages on sticks or cores, FIDELITY Hydraulic Control Spoolers produce perfect self-supporting tapers which need no end flanges.

Special type FIDELITY machines for winding such things as plastic tapes, surgical thread, ultra-fine filament wires, etc., frequently combine additional functions like inserting the wound package into a container.

Write for new catalog of FIDELITY Wire Spoolers.

BUY MORE BONDS

ARMY E NAVY

32 YEARS' EXPERIENCE

Designers and Builders of Intricate, Automatic Precision Machines

FIDELITY MACHINE COMPANY

3908-18 FRANKFORD AVENUE, PHILADELPHIA 24, PA.

Capitalize on R-S

A TYPICAL example of R-S thoroughness in adapting a type of furnace to a particular heat-treating job is the continuous convection, gas-fired furnace illustrated above. Frankly, we are not permitted to divulge full details. Suffice it to say that the production results substantiate our claims of exceptionally uniform and close temperature control (400 to 1300°F.), general over-all efficiency, automatic operation and minimum labor to load and unload. Parts are loaded on the wire mesh belt which moves at a constant, set speed, variable at will.

From the viewpoints of delivery, efficiency in operation and reliability, the R-S Furnace record is truly outstanding. It justifies the use of the expression "Furnaces of Distinction."

FURNACE DIVISION

R-S Products Corporation

4524 Germantown Ave., Philadelphia 44, Penna.

FORGING • PLATE AND ANGLE HEATING • CAR HEARTH
METAL MELTING • CONVECTION • ROTARY HEARTH
ANNEALING • CONTINUOUS CONVEYOR • SALT BATH

R-S Furnaces of Distinction

BUY WAR BONDS

edged blades of safety razors. Eugen Feist, Germany. 8-30-27.

(86) 1,663,907. Grinding machine for safety razor blades of the double-edged type. A. Friedrich, Germany. 3-27-28.

(87) 1,948,128. Grinding and polishing device to be used on saw blades of all kinds and similar articles in band and circular form. E. Poeggel, Germany. 2-20-34.

(92) 1,846,341. Surface grinding machine consisting of two uprights for carrying the grinding wheel framing between which it can move vertically. K. Jung, Germany. 2-23-32.

(92) 1,850,799. Grinding machine for grinding so-called spline-shafts as are used in selective shift gears for automobiles. Claus June, Germany. 3-22-32.

(92) 2,206,492. Spline shaft grinding machine to be used in cutting the teeth of gear wheels and the like and producing in general circumferentially profiled pieces of work. R. Westenberger, W. Hauffe and W. Georgi, Germany. 7-3-40.

(95) 1,965,035. Machine for cutting screw threads. H. Godziewski, Germany. 7-3-34.

(95) 2,060,396. Machine for grinding valves of the mushroom or poppet type. O. Klein, Germany. 11-10-36.

(95) 2,125,584. Adjusting device for machine tools used in the production of threads as in screw threading lathes, thread grinding machines and the like. E. Rotzoll, Germany. 8-2-38.

(95) 2,130,021. Grinding machine of the type in which a grinding wheel is mounted to rotate on a swinging bracket. F. Neugart, Germany. 9-13-38.

(95) 2,169,159. Thread cutting and grinding machine for the manufacture of threaded elements such as bolts and the like. G. Moller, Germany. 8-8-39.

(95) 2,267,250. Production of cross-section profiles bounded by cycloidal curves. R. Mossdorf, Germany. 12-23-41.

(98) 2,215,752. Grinding machine for injection needles. H. Enya, Japan. 9-24-40.

(98) 2,217,145. Saw sharpening machines for sharpening the teeth of chain saws in which each link of the chain constitutes a tooth. A. Stihl, Germany. 10-8-40.

(100) 1,927,154. Method and a machine for grinding of tuning-tongues. A. Dix, Germany. 9-19-33.

(100) 2,222,454. Grinding and polishing machine for automatically grinding and polishing elongated or extended articles of any material and any shape. F. Zeiss, Germany. 11-19-40.

(101) 1,727,434. Device for manufacturing templates for molds for grinding deformed spherical surfaces. T. Klatt, Germany. 9-10-29.

(101) 1,778,977. Follower for line templates. W. Kosfeld, Germany. 10-21-30.

(101) 1,849,626. Machine for automatically shaping stones and the like. W. Kosfeld, Germany. 3-15-32.

(101) 2,209,538. Means and method for producing cams and particularly with the production of a complementary cam pair. K. Rabe, Germany. 7-30-40.

(103) 2,040,553. Production of wiretacks and the like having heads preferably of disk-like proportions. J. Hockelmann, Germany. 5-12-36.

(103) 2,116,031. Machine for grinding screw thread. H. Lindner, Germany. 5-3-38.

(105) 1,975,899. Machine for grinding the inner surfaces of cylinders or the like. K. Jung, Germany. 10-9-34.

(105) 2,028,315. Grinding machine in which the grinding disk is trued at certain intervals by means of a diamond which either is at rest or reciprocates in a parallel movement to the axis of rotation of the grinding disk. P. Bruhl and F. Neugart, Germany. 1-21-36.

(105) 2,207,268. Finish grinding mechanism to be used for the finish grinding of cams or other irregular shapes. K. Rabe, Germany. 7-9-40.

(108) 1,746,593. Device for pointing bristles of brushes consisting of a rotatable bristle carrying wheel for attaching a number of bristles radially on the circumference and an abrading wheel having numerous needles projecting from the circumference. Riichiro Izawa, Japan. 2-11-30.

(108) 1,762,681. Cork-grinding machine. S. di Bono, Italy. 6-1-30.

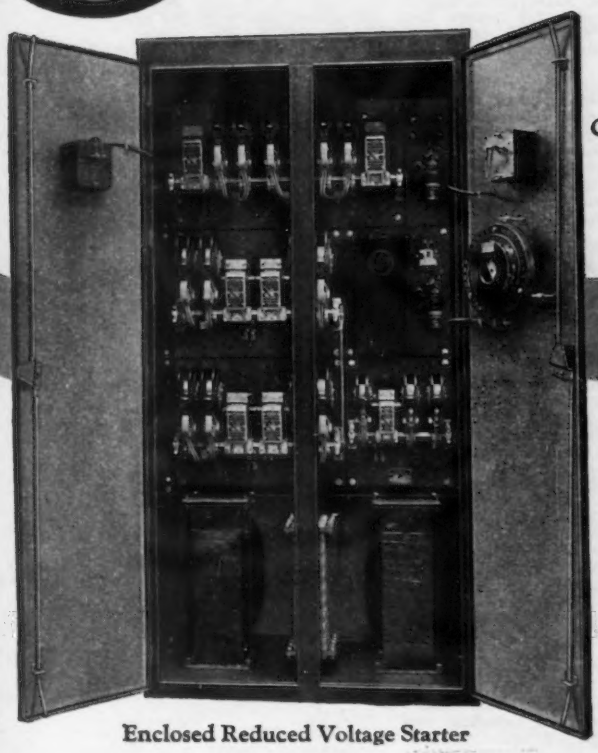
(109) 1,909,987. Device for grinding razor blades consisting of a paramagnetic spindle rotated by the magnetic force of attraction contained therein. A. S. Goltl, Austria. 5-23-33.

(109) 2,033,034. Grinding and polishing device for use on flat surfaces more especially

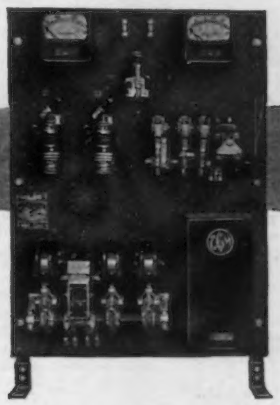
SYNCHRONOUS STARTERS FOR 220-550 VOLT MOTORS

•

Companion Line to Bulletin 1075-A, Oil-immersed Starters



Enclosed Reduced Voltage Starter



Standard Open Starter for Full Voltage Starting

AIR-BREAK TYPE WITH *LINE-ARC* CONTACTORS

D-C AUTOMATICALLY APPLIED TO FIELD BY ELECTRONIC RELAY

Above view shows field-switching contactor at right. This has one normally-closed and two normally-open contacts. At the left is easily adjustable, electronic-type relay which applies direct current to motor field to pull motor into synchronism automatically.

THESE are completely wired units, each with line and field ammeters, overload relays, mounting of exciter-field rheostat, auto-transformer (on reduced voltage starters), etc.

They are arranged for two or three phase service. Maximum ratings—(for both reduced and full voltage starting) 400 H.P., 220 volts and 800 H.P., 440 and 550 volts.

Standard features include equipment as illustrated and described above. Optional features include enclosures; disconnect switch; and when enclosures are desired for starters having this disconnect feature, space for 3-phase bus is provided at the top of the enclosure. Other options are indicating light; field-removal with automatic resynchronization should motor pull out-of-step, etc.

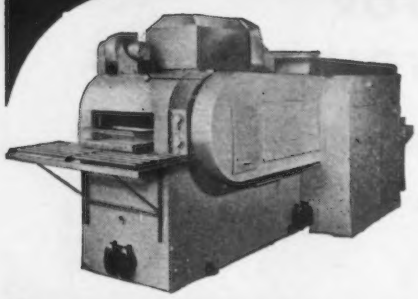
Complete details are given in Bulletin 1076-A. Ask for your copy to-day.

EC&M COMPLETELY AUTOMATIC — SYNCHRONOUS STARTERS

THE ELECTRIC CONTROLLER & MFG. CO., Cleveland 4, Ohio

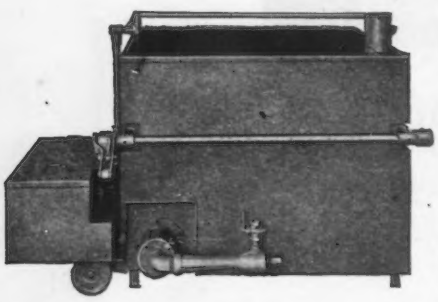
METAL PARTS CLEANING

Low Cost.. Efficient



STURDY-BILT "Soaker-Hydro"

A unit for positive, production line cleaning of metal parts, etc. Hot SOAKING PROCESS combined with powerful washing section. Equipped with a built-in Drying Unit and Chamber. Parts delivered properly cleaned and dried.



STURDY-BILT "Simplex"

A small, compact, mechanically simple unit combining ACTIVE-SOAK with WASHING ACTION. Removes oil; grease, chips from metal parts, assemblies, castings, etc. Can be installed individually in different departments or in a series for consecutive steps of cleaning, rinsing, coating or treating. Also the S-B DRYER for complete installation.

RECENT INSTALLATIONS.

American Lava Corp. (3) Chattanooga, Tenn.
Imperial Brass Co., Chicago, Ill.
Chain Belt Co., Milwaukee, Wis.
General Motors Installations:
Diesel Div., Detroit, Mich.
Saginaw Gear Div., Saginaw, Mich.
Delco Remy Div. (2) Anderson, Ind.
Timken Bearing Corp.
Wisconsin Axle Div. (4) Oshkosh, Wis.
Aircraft Radio Corp., Wright Field, Ohio
U. S. Naval Air Training, Memphis, Tenn.
McCulloch Eng. (Borg-Warner), Milwaukee, Wis.
Western Electric Co., Clifton, N. J.
Martin Rockwell, Jamestown, N. Y.
& Others

Send for complete details on either or both units

STURDY-BILT
EQUIPMENT CORPORATION
Dept. IA-112 **West Allis, Wis.**

in the manufacture of plate glass. Albert Knaff, Germany. 3-3-36.

(110) 1,816,969. Machine for cleaning timbers. W. Grinke, Germany. 8-4-31.

(110) 2,050,777. Method of roughening metal foil in the manufacture of lithographic sheets. Richard Berger, Germany. 8-11-36.

(112) 1,828,663. Machine for grinding simultaneously two opposed surfaces of articles of prismatic or other shape, especially nuts. A. Jopp, Germany. 10-20-31.

(115) 1,662,679. Cutlery grinding and polishing machine. H. Kessel, Germany. 3-13-28.

(116) 2,114,106. Device for grinding knives and scissors. W. Geveke, Netherlands. 4-12-38.

(122) 2,213,756. Grinder for rotary tools although articles other than tools not of the rotary type may also be ground. K. Zwick, Germany. 9-3-40.

(123) 2,202,111. Machine for grinding crank pins. C. Mayer, Germany. 5-28-40.

(123) 2,258,510. Method and machine for grinding straight and inclined toothed spur wheels. F. Laessker, Germany. 10-7-41.

(123) 2,275,804. Apparatus for grinding involute gear teeth of the type in which the rolling movement between the work-piece and the tool is not uniform. E. Parz, Germany. 3-10-42.

(124) 2,144,095. Cutter grinding machine to be used in engraving machines. K. Zwick, Germany. 1-17-39.

(125) 2,184,955. Grinding and polishing machine for bodies soluble in a liquid, preferably of crystalline type, especially such as piezo-electric salt crystals. E. Gerlack, Germany. 12-26-39.

(125) 2,206,229. Machine for grinding and making ready printing plates. K. Kruger and L. Koop, Germany. 7-2-40.

(128) 1,904,282. Polishing apparatus specially for knives, forks and spoons, etc. R. Ern, Germany. 4-18-33.

(134) 1,906,050. Machine for grinding and polishing optical lenses. J. Desenberg, Germany. 4-25-33.

(135) 1,809,414. Machine for grinding wooden articles. J. Huser, Germany. 6-9-31.

(153) 1,739,167. Razor stropping device. P. Muller, Germany. 12-10-29.

(156) 1,870,571. Machine for the spherical grinding of billiard balls and other blanks. O. Kadzik, Austria. 8-9-32.

(164) 2,209,080. Ball polishing drum for mass production articles. K. Gurtelmeier, Germany. 7-23-40.

(165) 1,813,165. Adjustment device particularly for the cross-slides of grinding machines. K. Jung, Germany. 7-7-31.

(165) 1,949,795. Device for measuring work-pieces. R. Geh, Germany. 3-6-34.

(165) 2,035,119. Indicating device for use in connection with grinding tools intended for work having flat surfaces and being secured to a feed gear revolving about a vertical, horizontal or inclined axis for being led past the tool or tools, preferably grinding wheels. V. Folsche, Germany. 3-24-36.

(165) 2,164,169. Optical profile grinding machine used for grinding of form-gages and form-tools. R. M. Wohlfarth, Germany. 6-27-39.

(165) 2,197,308. Machine tool in which a magnified image of the cutting tool and the work piece profiles, at the point where the tool and the work piece engage, is produced by illumination, and checked with a diagram card. A. Kolb and W. Wilk, Germany. 4-16-40.

(165) 2,248,446. Optical profile grinding machine on which form-gages and form-tools, etc., are ground by causing a grinding-disk to grind the form-gages or form-tools to their actual shapes. R. M. Wohlfarth, Germany. 7-8-41.

(166) 1,771,540. Machine for grinding flat surfaces. K. Jung, Germany. 7-29-30.

(166) 1,909,110. Building up of machine tools, especially grinding machines, having, as an article of manufacture, a frame of grinding machines built up of a multiplicity of cells formed of rolled sheet metal and welded together preferably by spot welding. C. Krug, Germany. 5-16-33.

(166) 2,207,312. Supporting, cooling, and lubricating means for high-speed shafts or spindles. M. Consigliere, Italy. 7-9-40.

(166) 2,168,275. Slideway for wheel carriages of gear-grinding machines. A. Stephan, Germany. 8-1-39.

(166) 2,239,103. Headstock for machine tools, particularly grinding machines. K. Jung, Germany. 4-22-41.

(166) 2,259,870. Machine tool of the type in which a column mounted on the frame of the machine forms a guide for a vertically adjustable cantilever support on which one or more grinding tools are mounted for cooperation with the work pieces carried by a reciprocatory table; adapted for finishing the guiding faces of frames and table of tool machines or other machines. M. Ahnert, Germany. 10-21-41.

(166) 2,268,694. Axial stop for grinding spindles, especially for spindles carrying disks for grinding screw threads. E. Buchholz, Germany. 1-6-42.

(171) 2,114,109. Magnetic alloys with high initial permeability, more particularly to an alloy consisting mainly of iron, nickel, tin, and chromium. K. Honda and Tamotsu Nishina, Japan. 4-12-38.

(170) 1,990,053. Grinding machine electrically driven. H. Steinhart, F. Kratz, and E. Baumgratz, Germany. 2-5-35.

(184.30) 1,918,077. Internal grinding apparatus for polishing and calibrating or grinding the internal conical surfaces of tubular bodies by means of abrasives. G. Agostini, Italy. 7-11-33.

(184.30) 1,918,852. Internal cylinder grinding tool, the grinding cheeks of this tool being adjustable by means of a double cone or the like actuated by an axially shiftable piston acted upon by liquid pressure. E. Marx, Germany. 7-18-33.

(184.30) 2,242,028. Machine tool for finishing or grinding grooves on the inside of a hollow part. H. Fussenhauser, Germany. 5-13-41.

(184.3) 2,301,111. Apparatus for grinding a cylindrical passage in a work piece. P. Cuppers and F. Stein, Germany. 11-3-42.

(191) 1,742,643. Double-walled protective casing for the drum of centrifugal machines in which the inner sheel is made rotatable, so that on the pieces of the burst drum striking against it, the tangential force of the same will be converted into frictional energy. P. Boehm, Germany. 1-7-30.

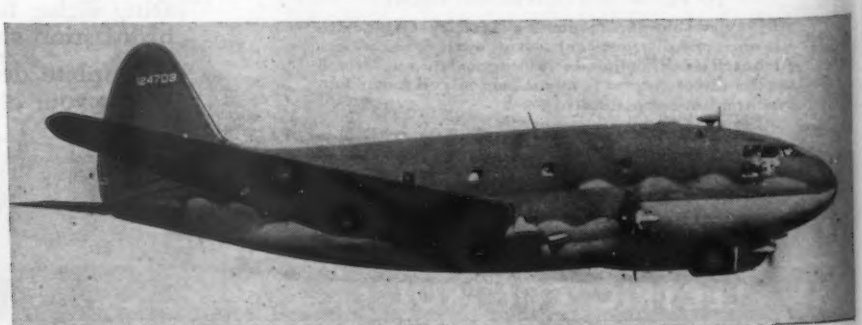
(206) 1,926,321. Wheel for grinding and polishing knife blades. J. Turek, Germany. 9-12-33.

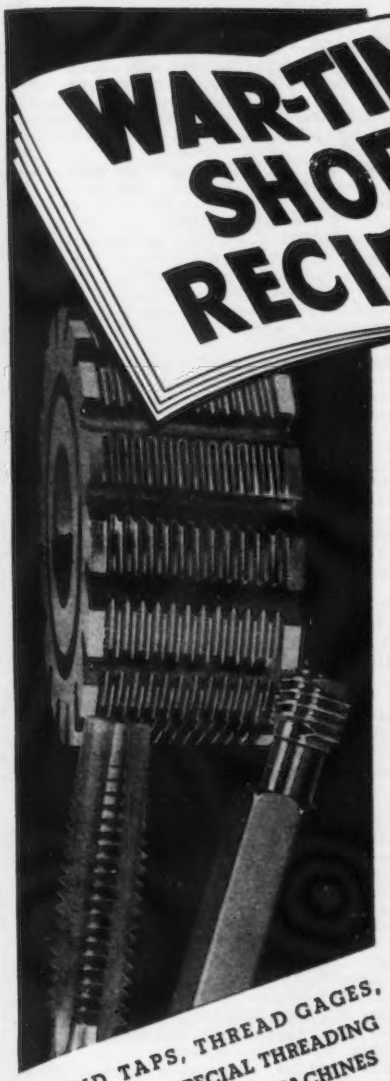
(206) 1,936,023. Grindstone for grinding wood into the so-called "mechanical" pulp used in the manufacture of newsprint and other cheap papers. A. Jordan, Germany. 11-21-33.

(206) 1,977,952. Cutting and grinding disk, in which the metal core of the disk or wheel is coated at the periphery thereof with an abrading material, is formed of a material possessing resiliency in the cutting plane. E. Offenbacher, Germany. 10-23-34.

(206) 2,004,630. Grinding disk of uniform

FREIGHT TRANSPORT: The transport plane selected for large scale production by Army Air Force in cooperation with Curtiss-Wright and Higgins Aircraft, Inc., is the Curtiss C-46 Commando, largest twin-engine cargo aircraft in the world.



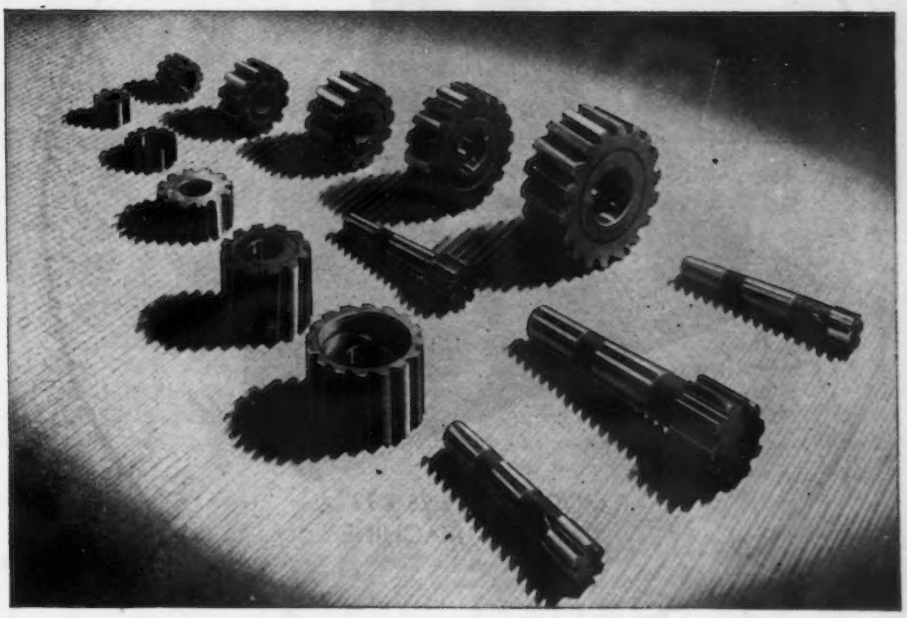


No. 7 IN
A SERIES

Announcing

DETROIT

STANDARD THREAD MILLING CUTTERS



GROUND TAPS, THREAD GAGES, THREAD HOBS & SPECIAL THREADING TOOLS. SPECIAL TAPPING MACHINES

Produced in the Nation's largest plant devoted exclusively to thread milling cutters.

Precision ground to your thread specifications from finish machined and heat-treated STANDARD blanks carried in STOCK.

Speeds Delivery
Simplifies Ordering

For list of standardized sizes, ask for Bulletin No. BC-43

BUY
U.S. BONDS
STAMPS

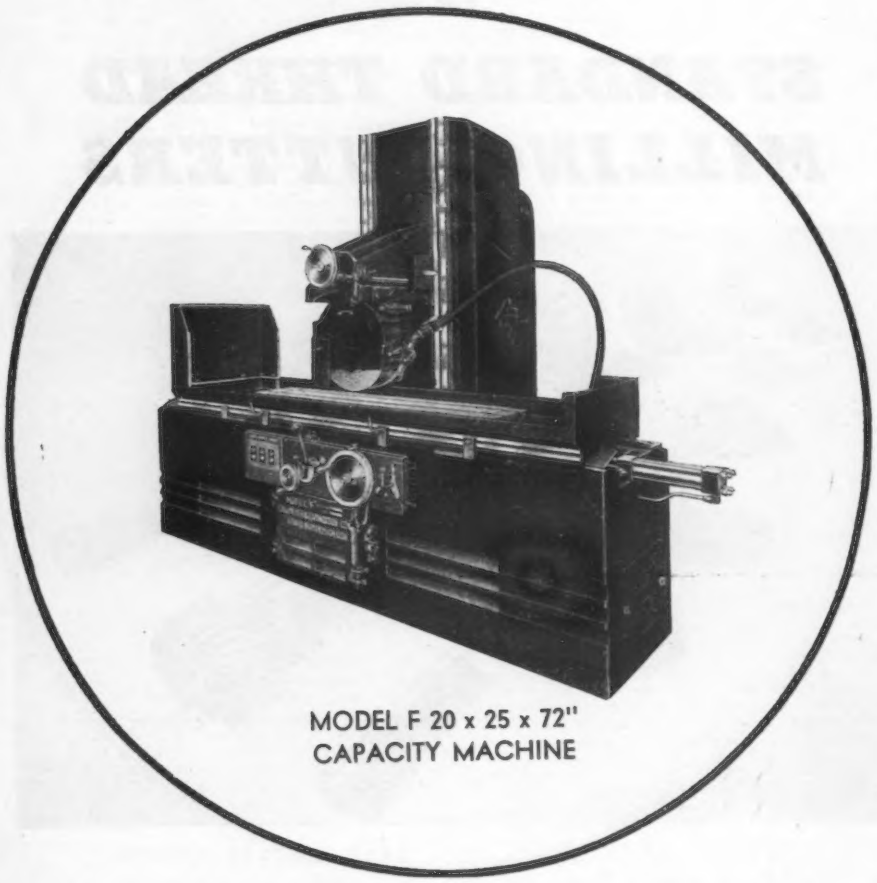
DETROIT
TAP & TOOL CO.

8432 BUTLER
DETROIT, 11
MICH. U.S.A.

GRAND RAPIDS

PRODUCTION TYPE HYDRAULIC FEED SURFACE GRINDERS

are meeting the most exacting needs of Army, Navy and Air Corps contractors requiring maximum production in surface grinding.



MODEL F 20 x 25 x 72" CAPACITY MACHINE

THE MACHINES ARE BUILT IN TWO TYPES:

MODEL "F" in sizes from 16 x 25 x 48" to 20 x 25 x 72", with maximum table speed of 150 F.P.M.

MODEL "A" in sizes from 12 x 18 x 36" to 14 x 18 x 72" with maximum table speed of 125 F.P.M.

Send for Bulletin 443

IF INTERESTED IN MODERN HIGH SPEED SURFACE GRINDING

GALLMEYER & LIVINGSTON CO.

200 STRAIGHT AVE., S.W.

GRAND RAPIDS MICHIGAN

basic structure, with an outer zone and a relatively narrow inner annular zone adjacent the arbor hole impregnated throughout the thickness of the wheel with a strengthening material, the outer annular zone being unimpregnated and unchanged. C. Krug, Germany. 6-11-35.

(206) 2,050,850. Grinding wheel with grinding discs clamped between flanges on the grinding shaft to be used for high grinding speeds. C. Krug, Germany. 8-11-36.

(206) 2,173,555. Disk for grinding surfaces, grooves, threads, or the like on cylindrical work-pieces. H. Hipple, Germany. 9-19-39.

(209) 2,270,691. Grinding tool consisting of a metallic carrier with grinding material firmly superposed directly thereon. H. Schneider. 1-20-42.

(209) 2,279,045. Metal bonded abrasive body consisting of a ring-shaped hard metal alloy, a support therefor and an intermediate layer of solder between said alloy and support. J. Hinnuber nd E. Ammann, Germany. 4-7-42.

(212) 1,941,056. Method and device for polishing two-edged razor blades. F. Rohrbeck, Austria. 12-26-33.

(214) 2,160,979. Knife-rest having a face on which a knife can be ground. M. V. Moeller, Germany. 6-6-39.

(216) 2,262,103. Dividing apparatus for grinding machines for grinding of spur pinions, grooved shafts or the like. F. Laessker, Germany. 11-11-41.

(219) 1,662,521. Grinding machine for twist drills. C. Kobis, Germany. 3-13-28.

(219) 1,678,413. Machine for grinding spiral drills without departing from a straight cutting edge. A. Zahringer, Germany. 7-24-28.

(219) 2,217,091. Feeding device for grinding or cutting tools. K. Zwick, Germany. 10-8-40.

(225) 1,966,314. Automatic, hydraulically-actuated indexing device to be used for indexing straight or spiral-flute cutters such as gear hobs, face milling cutters, splined shaft cutters, etc. H. Schicht, Germany. 7-10-34.

(232) 1,815,112. Tool grinding machine comprising a work spindle, a work spindle holder reciprocable in the longitudinal direction of the work spindle and means for rotating the work spindle according to the curvature of the edge of the tool to be ground. K. Metzler, Germany. 7-21-31.

(232) 2,061,778. Compensating mechanism for thread cutting machines. H. Schit, Germany. 11-24-36.

(233) 1,717,385. Controlling device for machine tools, particularly grinding machines. K. Jung, Germany. 6-18-29.

(233) 2,092,215. Automatic internal grinding machine. K. Jung, Germany. 9-7-37.

(241) 1,933,016. Valve grinder adapted to reface valve seats by grinding and truing them to predetermined limits. J. O. Huse, Germany. 10-31-33.

(247) 1,723,510. Cigarette machine. M. Hohn, Germany. 8-6-29.

(247) 1,752,341. Sharpening-roller arrangement for the revolving sickle knives in cigarette-rod machines. M. Hohn, Germany. 4-1-30.

(247) 1,759,747. Cigarette making machine. M. Hohn, Germany. 5-20-30.

(247) 1,846,807. Cutter for cigarette machines. M. Hohn, Germany. 2-23-32.

(247) 1,852,397. Cutting device for cigarette strand machines. M. Berger, Germany. 5-5-32.

(247) 2,174,048. Machine for sharpening knives for plush and velvet cutting. W. Trujen, Germany. 9-26-39.

(247) 2,297,468. Sharpening device for the rotating sickle knife of cigarette rod machines. P. Graupner, Germany. 9-29-42.

(248) 1,746,257. Means for sharpening the fly cutters of cigarette-rod machines. M. Hohn, German. 2-11-30.

(248) 1,950,177. Grinder for fly cutter of cigarette rod making machines. M. Hohn, Germany. 3-6-34.

(249) 2,121,879. Tobacco cutting device with rotating knives. V. Lorentz, Germany. 6-28-38.

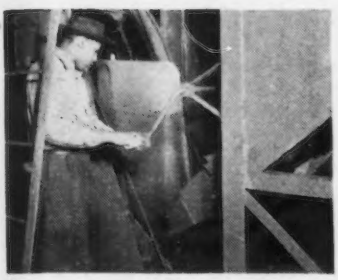
(254) 1,806,226. Apparatus for grinding the rolls of ore crushing or similar mills. A. Voegel, Germany. 5-19-31.

(259) 1,628,753. Grinding device having a headstock comprising a rotatable casing mounted on the frame of the tool, a fixed shaft mounted on the casing and carrying a dead centre, a rotatable shaft mounted on the casing and carrying a chuck, and means permitting rotation of said casing on the frame of the tool for presenting either the dead center shaft or the chuck carrying shaft to the work. W. Storck, Germany. 5-17-27.

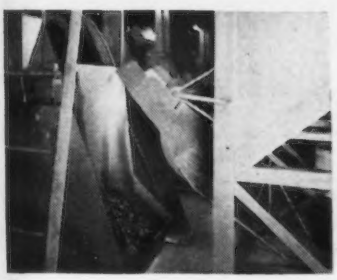
TO BE CONTINUED IN AN EARLY ISSUE

ALL SET FOR A BIG CLEANUP

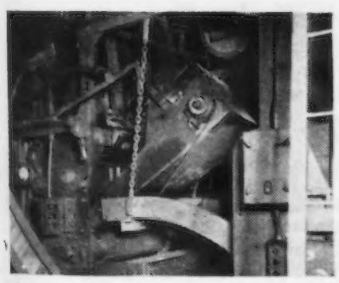
1



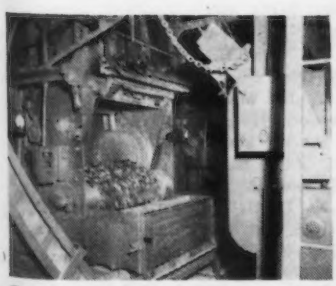
2



3



4



5

LIKE many other large producers of metallic belt links for machine guns, the National Stamping Co. of Detroit relies entirely upon the airless Wheelabrator for the cleaning operation. Six 27″ x 36″ Wheelabrator Tumblasts handle the entire daily production.

Queried about their experience with the Wheelabrator, Mr. W. G. Scott, consulting engineer for this company, said: "Wheelabrator Tumblasts are by far the most economical method. We cannot afford to hazard valuable products to methods less subject to exacting control, especially when each five foot batch is worth from $50.00 to $120.00."

The immensity of the daily production plus the speed with which the Wheelabrators operate, made it necessary to design a quick-handling method for conveying work to and from the machines. The pictures illustrate the flow of work.

Following the hardening operation, which occurs at ground level, the links are hoisted to an overhead mezzanine and dumped into any one of six storage hoppers located above and behind the skip bucket loaders used for charging the mills. A balanced spout located at the bottom of each hopper is so designed that approximately one skip hoist load of links is handled by one dumping action.

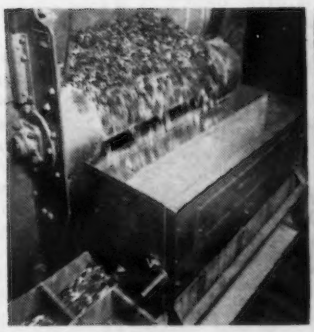
Only one operator on the floor level is required to operate and load the six machines. Only one-fourth of his time is applied to the shot-blast conveyor and the four-way bin system. The entire set-up requires the manpower of only 1.8 operators.

The cycle of operation of the six Tumblasts is progressive, with the operator working from one end of the system to the other. Charging the mill with the skip bucket loader takes 30 seconds; the mill is timed to blast 10 minutes, following which there is an unloading period of 30 seconds.

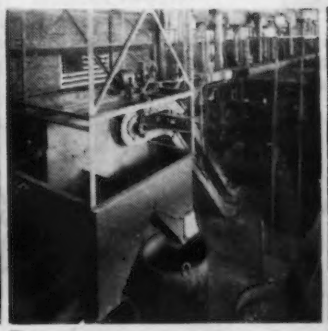
When unloading, a movable baffle plate diverts the finished links to either one or the other side of a two-compartment conveyor belt, depending upon the size of the links and the ultimate delivery point desired. The links then move forward to a four-way bin dumping mechanism where a baffle arrangement diverts the discharging links into the proper compartment for size segregation.

American
FOUNDRY EQUIPMENT CO.

510 South Byrkit St. Mishawaka, Ind.



6



7

8

WHEELABRATOR
Airless Blast Cleaning

Chrome Ore and Chrome Magnesite

(CONTINUED FROM PAGE 55)

duction furnaces is not considered desirable where a large range of special alloy steels is being made.

Acknowledgement

The author desires to express his thanks to Dr. T. Swinden, Director of Research, United Steel Co.'s, Ltd., for permission to publish this article, and to his colleagues in the steel and refractories industries for their constant collaboration.

Bibliography

(Excluding references already dealt with under furnace articles)

GENERAL

Allen, R., and Howling, G. E., Imperial Inst. Min. Res. Dept. Pubn. "Chrome Ore and Chromium," London, 1940.

Seil, G., Penn. State Coll. Min. Ind. Expt. Stat. Bull., 1934, 14, 40; Industrial Minerals and Rocks (p. 199), A.I.M.E., 1937.

THE SPINELS

Lattice Structure and Other Properties:

Clark, G. L., Abde Ally, and Badger, A. E., Am. J. Sci., 1931, 22, 539.

Clark, G. L., Howe, E. E., and Badger, A. E., J. Amer. Ceram. Soc., 1934, 13, 7.

Holgersson, S., Z. anorg. Chem., 1930, 192(1), 123.

Hugill, W., Iron and Steel Inst., Spec. Report No. 26, 1939, 201.

Parmelee, C. W., Badger, A. E., and Ballam, G. A., Univ. of Illinois, 1932, Bull. No. 248, Engin. Expt. Sta., 56 pp.

Rieke, R., Ber. deut. keram. Ges., 1931, 12, 163.

Winchell, A. N., Amer. Mineralogist, 1941, 26, 422.

Binary Systems, Including Reaction Rates, etc.:

Cr_2O_3-Al_2O_3

Bunting, E. N., Bur. Stand. J. Res., 1931, 6, 948.

MgO-Cr_2O_3

Chesters, J. H., and Parmelee, C. W., J. Amer. Ceram. Soc., 1935, 18, 94.

Hedvall, J. A., and V. Ny., Z. anorg. allgem. Chem., 1937, 235, 148.

MgO-Al_2O_3

Rankin, G. A., and Merwin, H. E., J. Amer. Chem. Soc., 1916, 38, 566.

Wartenburg, H. von, and Prophet, E., Z. anorg. allgem. Chem., 1932, 208, 369.

Ternary Systems:

MgO-FeO-Fe_2O_3

Roberts, H. S., and Merwin, H. E., Am. J. Sci., 1931, 5th Series, 21, 145.

RAW MATERIALS

As Mined:

Caesar, F., and Konopicky, K., Ber. deut. keram. Ges., 1939, 20, 362.

Fisher, L. W., Amer. Mineralogist, 1929 (Oct.), 14, 10; Econom. Geologist, 1929, 24, 7.

Konopicky, K., and Fisher, F., Ber. Deut. keram. Ges., 1939, 20, 367.

Lynam, T. R., and Rees, W. J., Trans. Brit. Ceram. Soc., 1939, 38, 211.

Ridgway, R. H., Bur. Mines Info. Circ. No. 6886, p. 11; U. S. Bur. Mines Minerals Yearbook, 1936, 1937, 1939.

Smith, L. A., Bur. Mines Min. Yearbook, 1932-33; Trans. Am. I.M.E., 1931, 96, 376; U. S. Bur. Min. Info. Circ. No. 6566, 1931.

Prefiring:

Seil, G. E., Brit. Pat. 409,130, April 4, 1933; U. S. Pat. 2,060,697, Nov. 10, 1936; U. S. Pat. 2,214,353, Jan. 13, 1939.

Triggs, W. W., and Seil, G. E., Brit. Pat. 451,493, Nov. 2, 1934.

Properties:

Caesar, F., Ber. deut. keram. Ges., 1935, 16, 515.

Lynam, T. R., Chesters, J. H., Howie, T. W., and Jay, A. H., Trans. Ceram. Soc., 1942, 41, 27.

Schauer, T., Tonind. Ztng., 1939, 63(61), 701 and (62), 72.

Toy, F. L., Open Hearth Conference Report (U. S.), 1942, p. 69.

MANUFACTURE OF CHROME AND CHROME MAGNESITE BRICK

Chrome Brick:

Heindl, R. A., Bur. Stand. J. Res., 1933, 10, 715.

Lynam, T. R., and Rees, W. J., Trans. Ceram. Soc., 1938, 37, 481.

McDowell, J. S., and Robertson, H. S., J. Amer. Ceram. Soc., 1922, 5, 865.

Pitt, N. P., Halferdahl, A. C., and Lathe, F. E., U. S. Pat. 2,270,220, April 1, 1937. Brit. Pat. 493,773, Apr. 4, 1937; Canadian Pat. 385,034, Nov. 14, 1939.

Seil, G. E., U. S. Pat. 2,060,697, Oct. 10, 1935.

Chrome-Magnesite Brick:

Chesters, J. H., J. West. Scot. I. and S. Inst., 1938-39, 46(4), 65.

Chesters, J. H., and Parmelee, C. W., J. Amer. Ceram. Soc., 1935, 18, 94.

Craig, J. W., and Pitt, N. P., Can. Chem. & Met., 1937, 21, 243.

Didierwerke, A. G., Ger. Pat. 679,915, Apr. 3, 1936.

Harvey, F. A., and McDowell, J. S., U. S. Pat. 2,053,146, 1933, Apr. 21.

Heuer, R. P., Steel, 1935, 97, 30, 22; Brit. Pat. 489,680, May 28, 1937; Can. Pat. 372,045, Nov. 27, 1936; U. S. Pat. 1,992,483, Feb. 26, 1935; U. S. Pat. 2,087,107, July 13, 1937; U. S. Pat. 2,253,620, Aug. 26, 1941; Metals and Alloys, 1940, 11(4), 95; 1940, 11(5), 152.

Konopicky, K., Stahl u. Eisen, 1941, 61, 53.

Koppers, H. G.m.b.H., Germ. Pat. 606,701, Dec. 8, 1934.

Lynam, T. R., and Rees, W. J., Trans. Ceram. Soc., 1937, 36, 137, 152.

Oesterr. Amer. Magn. A. G., Brit. Pat. 435,448, Jan. 22, 1934; Austrian Pat. 150,288, Feb. 10, 1940.

Seil, G. E., U. S. Pat. 2,028,017, May 27, 1931; U. S. Pat. 2,028,018, Oct. 28, 1932; Brit. Pat. 409,130, Apr. 10, 1933; Can. Pat. 367,279, Oct. 30, 1936; U. S. Pat. 2,037,600, Apr. 14, 1936; U. S. Pat. 2,060,697, Nov. 10, 1936; Brit. Pat. 468,659, Sept. 24, 1936; French Pat. 811,670, Apr. 20, 1937.

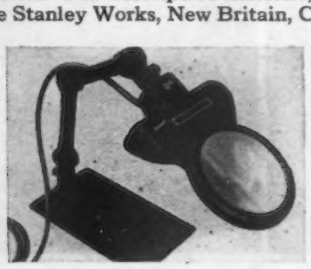
Trostel, L. J., THE IRON AGE, 1935, Dec. 5, pp. 26 and 95; Blast Fce. Stl. Plant, 1935, 23, 621; Blast Fce. Stl. Plant, 1935, 23, 776; J. Amer. Ceram. Soc., 1939, 22, 46.

STANLEY "FLUD-LITE"

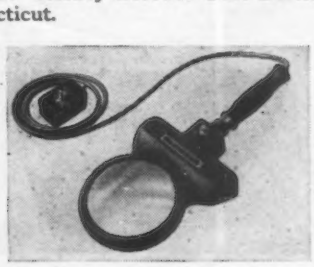
- Fluorescent Light
- Prevents Eye-Strain
- Speeds Production
- 110-120 v. A.C. current

1843 STANLEY 1943

Aids "Eye-Efficiency" of inspectors, assemblers, machinists, toolmakers. (1) Throws brilliant "natural" light on work. (2) Big 5" diam. lens reveals tiniest cracks, flaws and errors. Reamers, gauges, dies, etc., instantly checked. For descriptive material, write: Stanley Electric Tool Division, The Stanley Works, New Britain, Connecticut.

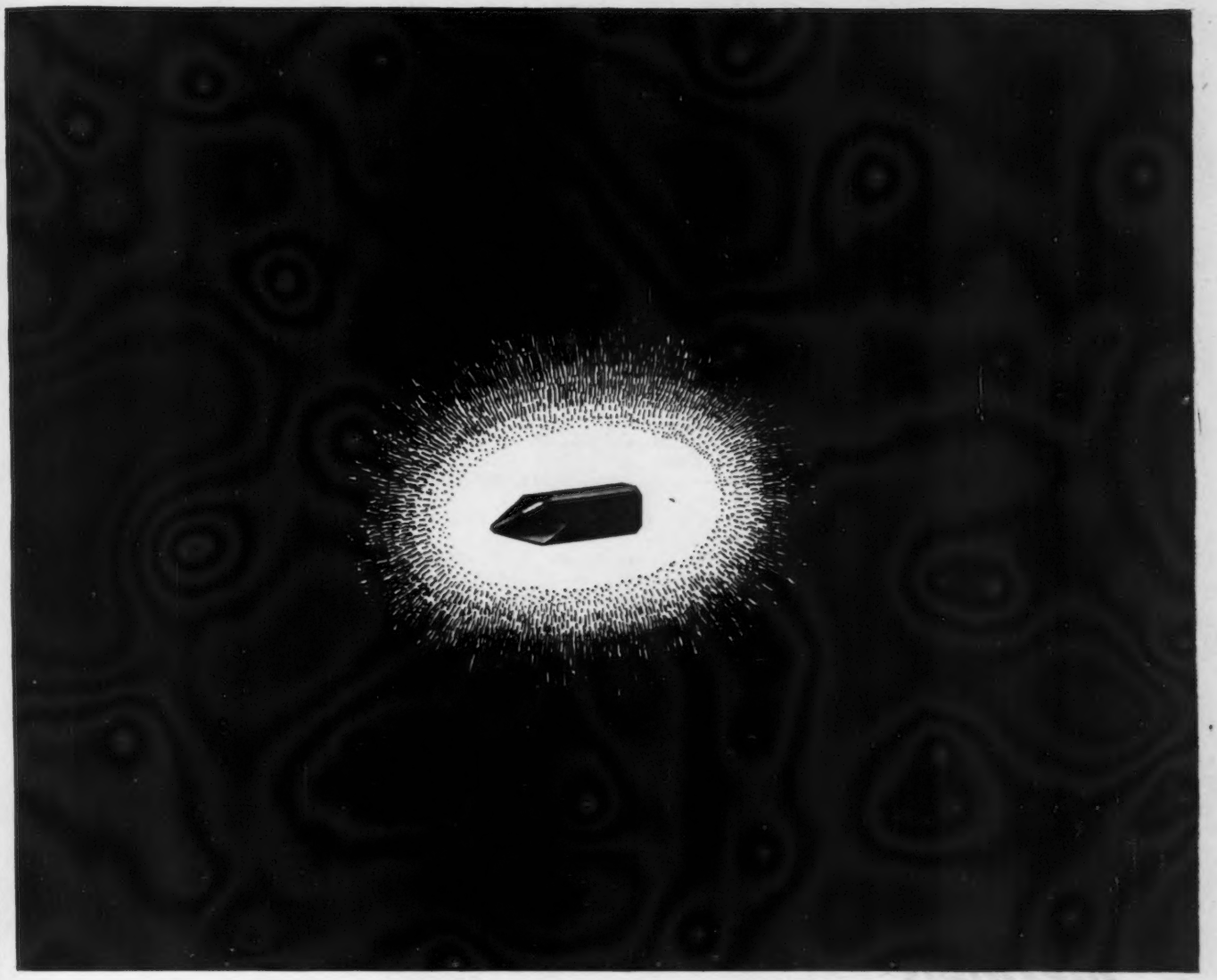


701 BENCH TYPE: Swivel joints permit adjustment to any position. Base removable to allow attachment to machine or in any other location.



701 H PORTABLE TYPE: Permits inspection anywhere in plant, inside machines or other confined spaces. Hardwood handle and 6' approved cable.

STANLEY ELECTRIC TOOLS



We made a smaller PHILLIPS bit do a bigger job

. . . and save money, steel, replacements, and handling

Apex-Phillips Service Drive Bits are shorter in length—and longer on savings and service—than ever before. By using a few standard sizes of holders and insert-type bits available in four point sizes, you make four important savings.

Once you've bought the holders you need, you carry a stock of insert tips only. One range of inserts fits various sizes of holders. The tips are small, and hence release steel for other war uses. Float between holder and bit means less wear on the point, because tip and screw recess align easily and accurately. Lastly, return of used bits for reconditioning is unnecessary. The cost of the inserts amounts to approximately the same as reconditioning charges.

Meet the family of Apex-Phillips Service Drive Bits.

Four sizes—¼" hex, 5/16" hex, ¼" square and 5/16" square, comprise the entire range of inserts with their various Phillips point sizes for our complete range of holders.

Write for Bulletin 102, describing this new (pat. pend.) type of bit and Apex holders to fit practically every make of power drive.

APEX

THE APEX MACHINE & TOOL COMPANY • DAYTON, OHIO

keep step with

modern precision methods

QUICK precision adjustment with Laminum shims helps modern machine design, construction and operation ... sets a new pace in production efficiency.

Shims cut to your specifications. Stock shim materials obtainable from your dealer. Write us for further information and shim application chart.

Laminated Shim Company
Incorporated
76 Union Street • Glenbrook, Conn.

LAMINUM
THE SOLID SHIM THAT peels FOR ADJUSTMENT
2041

Twynham, T., Brit. Pat. 15,163, Oct. 27, 1915.

Electrocast Blocks:

Benner, R. C., Baumann, H. N., and Easter, G., U. S. Pat. 2,279,260, Apr. 7, 1942.

Hirsch, H., Tonind. Ztng., 1932, 56(93), 1147.

Schmauser, J., ibid., 1932, 56(93), 1123.

Sittard, J., Stahl u. Eisen, 1932, 52(42), 1014.

Sprenger, A., Germ. Pat. 557,153, Aug. 26, 1930.

PROPERTIES OF CHROME AND CHROME MAGNESITE BRICK

Chrome:

McDowell, J. S., and Robertson, H. S., J. Amer. Ceram. Soc., 1922, 5, 865.

Chrome-Magnesite:

Chesters, J. H., and Rees, W. J., Claycraft, 1931, 4, 285.

Chesters, J. H., Trans. Ceram. Soc., 1937, 36, 309.

Dodd, A. E., Trans. Ceram. Soc., 1938, 37, 436.

Rees, W. J., and Lynam, T. R., Trans. Ceram. Soc., 1937, 36, 307 (c.f. B.R.R.A. Bull. 34, 46, 1934, and B.R.R.A. Record, 1935, 12(27)2).

Other Composite Refractories Containing Chrome:

Chrome-Alumina:

Lynam, T. R., and Rees, W. J., Trans. Ceram. Soc., 1937, 36, 110; Trans. Ceram. Soc., 1937, 36, 133.

McMullen, C., U. S. Pat. 2,063,154, Dec. 18, 1933.

Chrome Dolomite:

Carrie, G. M., Craig, J. W., Halferdahl, A. C., and Lathe, F. E., Brit. Pat. 381,-981, July 25, 1931; Germ. Pat. 634,763, Jan. 28, 1936.

Craig, J. W., Can. Inst. Min. Met., 1936, 513.

Lathe, F. E., and Pitt, N. P., Chem. Eng. Congr. World Power Conf., 1936, B.1., 19 pp.

Harvey, F. A., and Birch, R. E., Can. Pat. 363,991, July 24, 1935; Can. Pat., 358,664, June 23, 1936; Brick, 1937, 91, 44.

APPLICATIONS

Anon., THE IRON AGE, 1940, 145, No. 18, p. 52.

Chesters, J. H., and Lynam, T. R., J. Amer. Ceram. Soc., 1939, 22, 97.

Craig, J. W., Can. Inst. Min. Met., 1936, p. 526.

Dodd, A. E., Iron & Steel Inst., 1937, 10(11), 497; Trans. Ceram. Soc., 1938, 37, 339.

Fiske, R. A., THE IRON AGE, 1936, 138, 52 (Dec. 3rd).

Hugill, W., and Green, A. T., Trans. Ceram. Soc., 1938, 37, 279.

Isaac, S. R., Iron & Steel Inst. Spec. Report No. 22, 1938, 111.

Jackson, A., Iron & Steel Inst. Reprint, Aug., 1942; Ref. J., 1942, 18, 207.

Lindemuth, L. B., Blast Fce. Stl. Plnt., 1941, 29, 1109; THE IRON AGE, 1941 (Nov. 6 and 13), 148, No. 19, p. 47.

Matuschka, B., The Iron & Steel Inst. Spec. Report No. 22, 1938, 425.

Mund, A., THE IRON AGE, 1941, Dec. 14, 148, No. 23, p. 61.

Rees, W. J., and Lynam, T. R., Iron and Steel Inst. Spec. Report No. 26, 1939, 167.

Robinson, A., J. Iron and Steel Inst., 1938, 128, 109.

Veach, C. W., THE IRON AGE, 1932, Feb. 4, 339.

Needled Steel Specifications

(CONCLUDED FROM PAGE 67)

Army Ordnance, involves the production of a heat of 0.45 C., 1.50 Mn, Normal P., S., and Si steel, in which there will be 18 experimental ingots. Six different intensifying agents will be added to the ingots, in each case in three varying quantities, making six lots of three ingots each. One ingot of the heat will be left untreated as a control blank, and the remaining ingots, which will be treated to contain about 0.0025 per cent boron, will be used in production to make two forged truck parts, replacing 4100 steel. The production billets, rolled to 1¼ in. rd., will be used by General Motors Truck and Coach division, Chevrolet and International Harvester. As a second control blank for tests, a billet of 4140 steel will be used.

Of the experimental ingots, all which pass Jominy tests will be tested by Ordnance for fatigue strength, notched and unnotched, tensile strength at three draw temperatures, hardenability, grain size, inclusion rating and impact value at room and sub-zero temperature. All of the experimental ingots found to be usable will be made into production parts and will be service tested by Ordnance.

The addition agents to be used in the experimental ingots will contain boron, boron and calcium, boron and titanium, and boron and vanadium. Ordnance, declining to release for publication the specific additives used, explains that its object is not to prove or disprove the relative merits of the various proprietory agents, but rather to pin down production applications for needled steels and to make it possible for mills to accept orders for steels to Ordance specifications like those given in the first part of this article. Ordnance's position is that it doesn't care what additives are used, if its specifications can be reached.

Ordnance is sponsoring the experimental heat, but it is depending largely upon the American Iron and Steel Institute's alloy committee and the S.A.E. War Engineering Board's Iron and Steel Committee for making many of the tests and is coordinating the test data obtained with them.

The test data from the two programs should give a good idea of what can be done with addition agents, the optimum amounts to be added, and the resulting optimum boron content.

AJAX FORGING MACHINES

so advantageous in producing forgings for War . . . will play an important part in Post-War forging production

★ Buyers of Forging Machinery who are selecting AJAX machines now for the utmost in high speed, high quality forging of vital war material have the comforting assurance that the same sound advantages of faster production coupled with uniformly superior quality forging output will prove highly advantageous in their Post-War forging production.

Write for Bulletin No. 65-B

THE AJAX MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND, OHIO
621 MARQUETTE BUILDING · CHICAGO, ILLINOIS

PERSONALS

• **Charles W. Deeds** has been elected president and general manager of the Niles-Bement-Pond Co. of West Hartford, Conn., succeeding **Clayton R. Burt**, who has been elected to the new post of chairman of the board. Mr. Burt has been president of the company since 1924. Mr. Deeds formerly was associated with the United Aircraft Corp., in East Hartford, resigning as vice-president and general manager of its Pratt & Whitney aircraft division in 1938 to become president of the Chandler-Evans Corp., recently acquired by Niles-Bement-Pond.

• **Paul E. Floyd** has resumed his former post of district manager for Allegheny Ludlum Steel Corp., Chicago, after serving since early 1942 in the Iron and Steel Branch of the WPB.

• **C. A. Smith** has been appointed assistant to **Thomas I. Phillips**, vice-president, Westinghouse Electric & Mfg. Co., East Pittsburgh Divisions. Mr. Smith has been with Westinghouse for 51 years and served as manager of factory service at East Pittsburgh plant prior to this appointment.

• **P. F. Zerkle** has been appointed to direct sales activities of the Michigan Tool Co., Detroit. The company also is opening branch offices in both Cleveland and Dayton, Ohio. The Cleveland branch will be located in the Penton Building, with **George Pierce** as district manager, and the Dayton branch is located at 710 Harries Building with **H. E. Roedter** as district manager.

• **John C. Redmond** has been appointed research engineer and chief analytical chemist for Kennametal Inc., Latrobe, Pa. Recently he was engaged in chemical analysis, research and process development for the Youngstown Sheet & Tube Co.

• **Don S. Connor** has been appointed director of field engineering of Micromatic Hone Corp., Detroit, Mich. Mr. Connor has been with the company since 1933.

• **Clayton Grandy**, former chairman of the planning committee and trade association director of the Industrial Salvage Branch, WPB, was elected executive secretary of the Steel Products Warehouse Association, with headquarters in Cleveland.

CLAYTON R. BURT, chairman of the board, Niles-Bement-Pond Co., West Hartford, Conn.

• **W. H. Radeke** has been appointed service manager of Gould Storage Battery Corp., Depew, New York. Mr. Radeke has been a Gould service engineer in the Chicago area for the last seven years.

• **E. A. Murray** has been appointed assistant manager of the manufacturers sales department in the Chicago office of the American Steel & Wire Co., subsidiary of U. S. Steel Corp.

• **Harvey A. Craig** has been made district sales manager of Republic Steel Corp. in the Los Angeles district. **Arthur C. Geldner** will be assistant district sales manager in that territory.

• **Edward J. Burnell** has been made vice-president in charge of sales for the Link-Belt Co., Chicago. **Harold L. Hoefman**, manager of the company's Atlanta plant, succeeds Mr. Burnell as general manager of the Link-Belt Pershing Road plant in Chicago. **Richard B. Holmes**, district manager at Indianapolis, has been appointed manager of the Atlanta plant to succeed Mr. Hoefman. **David E. Davidson**, district engineer at the company's Detroit office, has been named district manager at Indianapolis, to succeed Mr. Holmes.

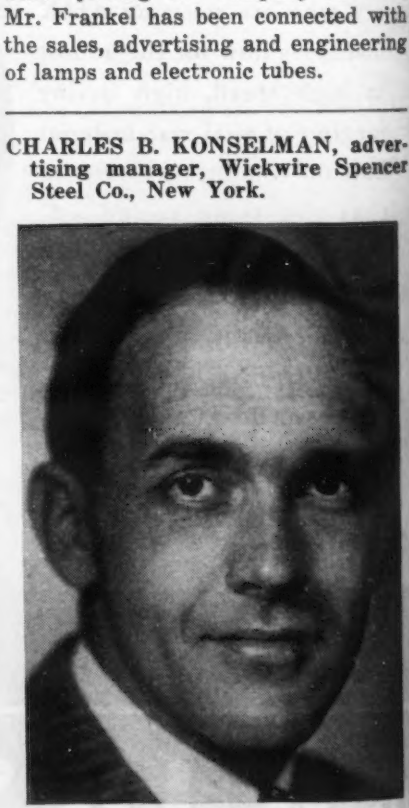
• **Charles B. Konselman** has been appointed advertising manager for Wickwire Spencer Steel Co., New York. He succeeds **George L. Randall**, recently commissioned a Lieutenant (j.g.) in the U.S.N.R. Prior to joining Wickwire Spencer Mr. Konselman was associated with the Royal Typewriter Co.

CHARLES W. DEEDS, president and general manager of Niles-Bement-Pond Co., West Hartford, Conn.

• **Kenneth Hall** has been made factory representative in the midwestern territory, for Snyder Tool & Engineering Co. of Detroit. Mr. Hall will make his headquarters at 1358 Berkley St., Deerfield, Ill.

• **R. F. Tucker** and **Adolph Frankel** have been appointed staff assistants to the manager of the Westinghouse Lamp Div., with headquarters at Bloomfield, N. J. Mr. Tucker, who joined Westinghouse in 1909, has been assistant division auditor since 1939. Since joining the company in 1917, Mr. Frankel has been connected with the sales, advertising and engineering of lamps and electronic tubes.

CHARLES B. KONSELMAN, advertising manager, Wickwire Spencer Steel Co., New York.



JOHN DUNN, works manager at Titeflex Metal Hose Co., Newark, N. J.

• **John Dunn** has been appointed works manager in charge of all plants of the Titeflex Metal Hose Co., Newark, N. J. Formerly production manager at Titeflex, Mr. Dunn joined the organization in 1935. Succeeding him as production manager is **Arthur F. Pennington**, who had formerly been superintendent at Titeflex.

• **Floyd Rose** was elected president of the Vanadium-Alloys Steel Co., Latrobe, Pa., at a recent meeting of the board of directors. Other officers elected were **Roy C. McKenna**, chairman of the board, and **James P. Gill**, vice-president of the company.

FLOYD ROSE, president of Vanadium-Alloys Steel Co., Latrobe, Pa.

• **David Arnott**, American Bureau of Shipping, New York, has been elected president of the American Welding Society. Other officers elected are: **Isaac Harter**, first vice-president; **A. C. Weigel**, second vice-president; **H. W. Pierce**, **E. R. Seabloom**, **K. V. King**, and **J. H. Deppeler**, directors-at-large.

• **R. P. Tyler** has been appointed general manager of sales and **C. R. Deam** assistant manager of sales of A. Leschen & Sons Rope Co., St. Louis.

• **Wallace K. Brown**, former vice-president in charge of procurements for the Crocker-Wheeler Electric Mfg. Co., has been made manager of the New York district sales of the Crocker-Wheeler Div. of the Joshua Hendy Iron Works.

• **J. M. Darbaker** was appointed assistant manager of the Chicago district operations of Carnegie-Illinois Steel Corp., U. S. Steel subsidiary. **Charles A. Ferguson**, assistant general superintendent of Gary Sheet & Tin Mills since 1938 succeeds Mr. Darbaker as superintendent. In his new position Mr. Darbaker succeeds **R. G. Glass**, who recently became vice-president and general manger of Geneva Steel Co. at Provo, Utah.

• **H E. Simi**, former chief engineer of Twin Coach Co., has been named project engineer at Timken Detroit Axle Co.

• **F. E. Phillips**, export sales manager and assistant sales manager of Gemmer Mfg. Co., Detroit, has been made vice-president in charge of sales.

• **Gerald Carlisle** has been named controller and assistant treasurer of Micromatic Hone Corp, Detroit. Mr. Carlisle came into the Micromatic organization in 1942.

• **William S. Gray, Jr.**, was elected a member of the board of directors of the Phelps Dodge Corp. Mr. Gray is president of the Central Hanover Bank & Trust Co., and president of the W. S. Gray Co.

• **Hugo A. Weissbrodt**, former deputy regional director, WPB, Detroit, has been appointed superintendent of the Fort Wayne, Ind., works, International Harvester Co., succeeding **C. M. Harrison**, who has retired. Mr. Weissbrodt was former assistant superintendent of Fort Wayne works and later superintendent of the company's Springfield, Ohio, works.

• **Chester F. Conner** has been named assistant general manager, and **Fred Lang** merchandise manager of the industrial products sales division of the B. F. Goodrich Co. Mr. Conner had previously been merchandise manager, and Mr. Lang, manager of sole and heel sales.

• **Glenn E. Winton**, former chief field quality engineer for the Minnesota Mining Co., has joined the technical staff of the Mid-West Abrasive Co. as quality engineer in the coated abrasive divisions.

• **E. W. Brock**, formerly service manager of Genesee Tool Co., Fenton, Mich., has been made service-sales manager of the branch office at 1409 Central Life Insurance Building, Cincinnati.

OBITUARY . . .

• **William E. Hedgcock**, vice-president in charge of sales for the American Car & Foundry Co., New York, died recently. Mr. Hedgcock, who joined the company in 1898, was formerly purchasing agent. He was 75 years of age.

• **James F. Harmon**, general superintendent of the Chevrolet Motor & Axle plant in Buffalo, died Nov. 4. Mr. Harmon had been superintendent in Buffalo since 1937 and previously was a superintendent for General Motors Corp. and Ford Motor Co. in Detroit. He was 56 years of age.

• **Fred J. Hayden**, sales manager and director of the Frankfurth Hardware Co., Milwaukee, died Oct. 31 after a brief illness.

• **Noble C. Banks**, president of the Gear Grinding Machine Co. of Detroit until his retirement in 1937, died Oct. 30. Before joining the Gear Grinding Machine Co., he was associated with Westinghouse Electric & Mfg. Co. and United States Steel Co.

• **Max L. Tost**, sales manager of the American Bosch Magneto Corp., died Nov. 7 in Detroit after a short illness. He was 63 years of age.

• **Herbert B. Briggs** engaged for many years in the sales promotion of alloy steels for Wheelock, Lovejoy & Co., Inc., and Joseph T. Ryerson & Son, Inc., died Nov. 6. He was 49 years of age.

• **M. W. Rogers**, president of the Universal Unit Machinery Corp. and the Davis & Thompson Co., Milwaukee, died Nov. 4. Mr. Rogers formerly was general factory manager of the Caterpillar Tractor Co., Peoria, Ill.

MACHINE TOOLS

. . . News and Market Activities

Tool Steel Section Opened By WPB

Cleveland

• • • **The Cleveland** regional War Production Board this week opened a tool steel section to expedite the distribution of large stocks of this material. Changing conditions during the past year have resulted in surpluses of tool steel, and the shortages of a few months back have disappeared. At present, the Facilities and Redistribution Branch of WPB in this region has 500,000 lb. of tool steel of varying makes, sizes, and shapes on inventory, and an inventory of considerably more is on hand nationally.

All tool steel users will be requested to list their inventories through the nearest WPB district offices, 16 of which are in this region. Warehouses will be able to purchase this steel on request, providing of course they have a quota to do so.

o o o

Disposition of Idle Tools One of Canada's Problems

Ottawa

• • • **Canada now is giving** consideration to the disposal of some of the surplus stocks of machinery, machine tools, steel and other metals that are in excess of war needs. In this connection it is stated that arrangements are proceeding for the establishing of an organization to deal with the disposal of large surpluses of machinery, equipment, materials and other goods which are being thrown into the lap of the government as war demands taper off. While no final decision has been reached, it is believed that a new Crown company will be set up with specific instructions regarding general principles on which surplus stocks and supplies will be disposed of.

One of the most urgent matters for consideration at this time is the disposal of machine tools which served their purpose in the early stages of Canada's war program, but are not being used at present due to war contract cancellations although they still are the property of the government. Consideration will have to be given as to whether the companies which used these tools will be permitted to purchase them and at what price and under what conditions, or if they are to be thrown on the market. Cancellation of orders has left numbers of machine tools idle. In many instances individual war contractors are anxious to buy these tools for their own use, but at present there is no medium through which they can carry out a proposal of this nature.

Machine tools are only one phase of the problem of surplus stocks and inventories of various kinds which will have to be dealt with by the government. Eventually there will be huge stocks of metals, machinery, equipment, small tools and cutters etc., which must be disposed of or withdrawn from use so as not to upset too greatly the return of business from war to peacetime operations. Each of these problems will require individual solution, but eventually there must be some overall solution.

•

Tool Contract Termination Slowed by Technicalities

• • • **Cincinnati machine tool** manufacturers continue to report a reasonably good flow of new business, but at a rate far below present production. Backlogs are being reduced constantly with present estimates at about four to five months. Programs and production on other items than machine tools to keep present forces occupied are being pressed rapidly and many plants in town are now in production at least to some degree on direct war article production. Executives of district machine tool plants continue to be greatly disturbed over renegotiation and cancellation of contract problems. Most plants have already submitted the bulk of their data for the renegotiators and are now in the process of what appears to be almost interminable conferences about the matter. Despite assurances from persons sent by Washington to address manufacturers, the program on cancellation of contracts continues to be disturbing. This has been largely due to a tightening attitude on the part of Washington, in tending to insist upon strict and highly technical interpretations of some of the clauses of the contracts which have in recent months come into question.

•

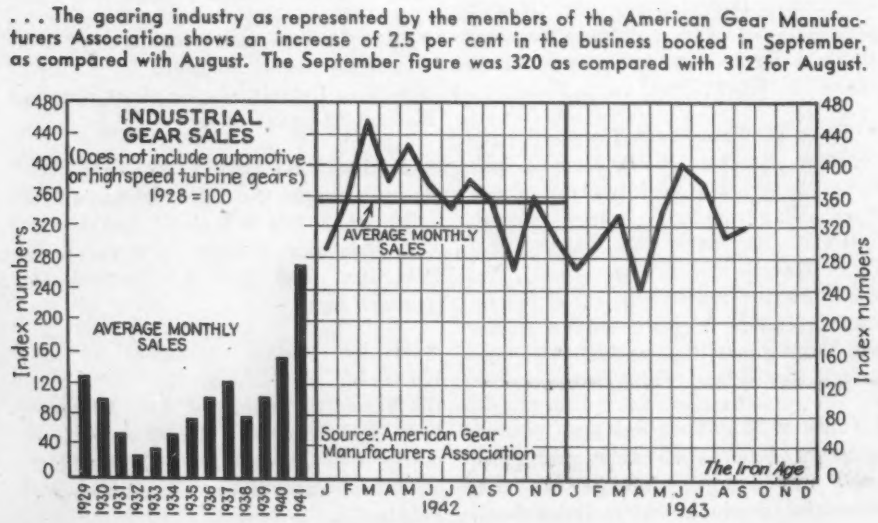
Chaser Output Improved

Washington

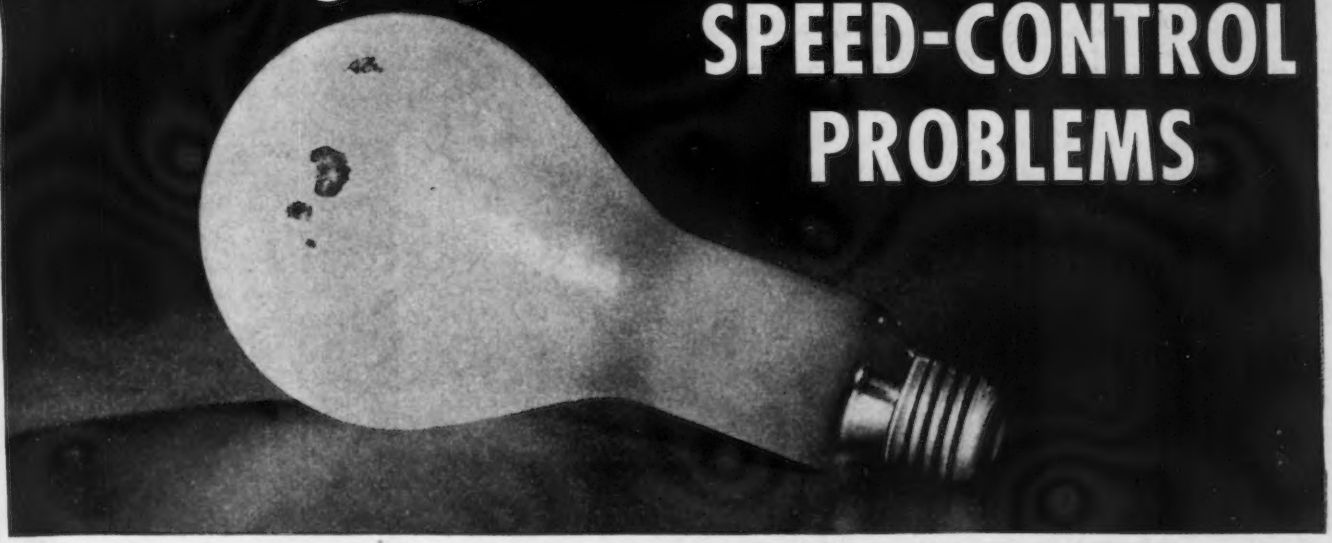
• • • **The production of chasers, which has been a bottleneck in the cutting tools industry, has improved to an extent recently, it was reported at a meeting of the Chaser and Collapsible Tap Industry Advisory Committee with WPB representatives in Washington recently.**

Gear Sales Up 2.5 Per Cent in September

. . . The gearing industry as represented by the members of the American Gear Manufacturers Association shows an increase of 2.5 per cent in the business booked in September, as compared with August. The September figure was 320 as compared with 312 for August.



Throwing Light on YOUR HOIST SPEED-CONTROL PROBLEMS



UNRETOUCHED, the spots on this electric bulb mark the resting place of a load lowered by an R & M hoist equipped with the new Push-Button Two-Speed Control. Proof of this new development's degree of control, the bulb could not be withdrawn while the load was on it.

There are many electric hoist operations that require accurate AC speed control. There are an almost equal number of opinions as to how to obtain it. But your interest is in *results.* Whether you want to lift heavy, capacity, or very light loads; whether your line voltage is up or down a little; whether a good operator is at the controls or a poor one, you want performance. You get it with an R & M Two-Speed Hoist.

Controversial, too, is the often heard reference to "four-speed" or "six-speed" control. A slip-ring motor gives one kind of speed control. Combined with resistance in the rotor circuit cut in or out by a number of steps, this motor may give several speeds for one weight load. For capacity loads, speed control may be satisfactory. Yet, if your load is 10%, 25%, or 40% of capacity, such speed control varies unfavorably. Gone are the same variations as for capacity loads because the slip-ring motor with rheostatic control must be preset to produce speed variations desired.

To meet non-uniform loading, voltage variation, and lack of operator skill, some hoists contain numerous resistance steps to compensate for variables impossible to control. Thus, large resistance banks, numerous controller fingers and segments, and a slip-ring motor must be maintained in an effort to obtain what can be had much more accurately and with much less maintenance cost with the R & M Two-Speed Hoist.

"Six-speeds," then, is simply an attempt toward the same result—one really slow speed for the varying types of work at hand. And there is no necessity for many speed variations provided you are certain of one slow, precisely controlled speed—always. (For large cranes, AC regenerative control is being introduced but such systems cannot be applied to small electric hoists.) After all, very slow speeds are needed usually for but a fraction of the time the hoist is at work. Following creeping-speed work, ordinarily, high-speed handling is in order.

Operator lowering load over electric bulb with Push-Button Two-Speed Control.

Load touching bulb. Paint on bottom plate of load produced marks on bulb shown above.

R & M Two-Speed Hoists do a better speed-control job. This is why:

A simple, two-winding squirrel-cage motor is used with synchronous speeds of 360-1800, 360-1200, or 600-1200 r.p.m. The slow speed of the hook will always be approximately ⅛, ⅓, or ½ of the high speed. Consider the importance of having these values remain unchanged regardless of variables—full load or empty hook; voltage up or down; operator, skilled or otherwise. The slow speed is fixed. The operator presses the button. He "fishes" for nothing.

But how slow is "slow"? Careful, repeated analysis has shown speeds of from four to six feet per minute to be entirely satisfactory for handling 90% of all slow, precision-speed needs. "Tickling" the push button provides hook movements that can scarcely be seen.

Robbins & Myers Hoists will give you precise, productive speed control just as they are doing now in foundries and in aircraft, machine-tool, and machine-shop plants all over the country. For your copy of the fact-filled booklet, "Electrical Details of Robbins & Myers Hoists," simply send for Bulletin W815, today.

ROBBINS & MYERS • INC.

HOIST & CRANE DIVISION, SPRINGFIELD, OHIO • In Canada: Robbins & Myers Co. of Canada, Ltd., Brantford, Ont.

★ ★ ★ MOTORS • MACHINE DRIVES • FANS • MOYNO PUMPS • FOUNDED 1878 ★ ★ ★

NON-FERROUS METALS

. . . News and Market Activities

Brass Mill Output Up 300% Since 1940

• • • **Brass mills in the** 12 months ended June, 1943, produced 2,611,890 net tons of primary products including 214,787 tons of copper products; 152,463 tons of alloy tube; 478,419 tons of alloy rod, and 1,766,221 tons of alloy strip of which 1,366,132 tons were made in privately owned plants and 400,089 tons in DPC plants, according to figures released by the Copper Division, WPB.

Output in the first half of 1943 was slightly higher than that of the previous six-month period. From January to June of this year, 1,410,444 net tons were produced while from July to December, 1942, 1,201,446 tons were made.

Greatest expansion occurred in government financed facilities which doubled output of alloy strip in the January to June period. In these plants, 266,560 tons of alloy strip were produced in the first six months of this year while output in the latter half of 1942 amounted to 138,529 tons.

Comparable figures for prior years are not available but the Copper Division announced that average monthly production in 1940 was 67,500 net tons compared with 235,074 net tons, the monthly average for the first half of 1943.

A breakdown of these figures by months and products follows.

BIG CASTING: One of the largest magnesium sand castings in regular production is this Dowmetal pump base weighing approximately 1000 lb.

Primary Brass Mill Production

The following figures on brass mill operations were compiled by the Copper Division, War Production Board, and released for publication by the Office of War Information.

(In Thousands of Pounds)

1942	Copper Products	Alloy Tube	Alloy Rod	Alloy Strip — Private Plants	Alloy Strip — Plancor Mills*	Total Strip	Totals, All Products
July	36,153	23,658	69,806	213,986	8,406	222,392	352,009
Aug.	36,211	25,235	70,340	208,542	26,790	235,332	367,118
Sept.	33,928	25,241	73,008	211,836	42,694	254,530	386,787
Oct.	39,897	28,399	81,209	222,922	59,540	282,462	431,967
Nov.	35,213	26,853	80,866	211,729	58,556	270,285	413,217
Dec.	41,016	25,652	82,045	232,009	71,072	303,081	451,794
1943							
Jan.	37,672	27,394	83,448	238,082	77,924	316,006	464,520
Feb.	34,418	24,878	80,276	222,494	78,144	300,638	440,210
March ...	37,526	26,780	93,119	246,454	95,484	341,938	499,363
April	33,248	23,566	79,483	245,792	92,638	338,430	474,727
May	32,248	23,748	82,511	249,563	96,326	345,889	484,396
June	32,044	23,522	80,646	228,855	92,604	321,459	457,671
Total ..	429,574	304,926	956,837	2,732,264	800,178	3,532,442	5,223,779

*Defense Plant Corp. projects.

o o o

Silver Consumption 130,000,000 Oz.

• • • **Consumption of silver** in 1943 will amount to 130,000,000 oz., it was estimated at meetings held in Washington last month to review the current position of that metal. Of this total 100,000,000 oz. is for essential purposes and 30,000,000 oz. for jewelry, silverware and other uses. The net consumption for engine bearings for 1943, a questionable figure for many months, has been clarified and will be much lower than the 25 to 35,000,000 oz. estimate heretofore used. Consumption in this field, however, continues to increase.

Domestic silver production continues at the previously estimated rate of about 40,000,000 oz. for 1943 and supplies of imported silver, mainly in the form of ore and base bullion for refining this country are holding up to the figure of about 20,000,000 oz. for the latter half of 1943, estimated early in August.

If silver imports continue at the prevailing rate of the third quarter, it is believed that there will be ample supplies to meet the needs of manufacturers making items on List A in Order M-199 which are the only uses permitted for foreign silver.

Judging from the relatively few protests received from industry since the silver order was amended on July 29, plus trade reaction at a meeting of jewelry and silverware manufacturers in Providence early in September, the basic plan for distributing foreign silver, Treasury silver and domestic silver to various types of users is working satisfactorily. The one notable exception pertains to the provision dealing with domestic silver quotas under toll arrangements. Industry members confirmed this general trade reaction.

The Miscellaneous Minerals Division has been actively cooperating with the Treasury Department for the past several months in formulating and revising a plan whereby the Treasury Department will agree to repurchase Treasury "free" silver from industry, subject to certain limitations, upon the expiration of the present war emergency. It is hoped that the final form of contract will be completed very soon and announced by the Treasury Department.

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	13.50
Aluminum, deoxidizing grades	12.50 to 13.75
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	12.25
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$15.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$10.00
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	21.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. shipping point or port of entry	$191 to $193.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness: 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base. 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire, Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths. ¼ in., 34c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotation. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25

OPA Group 3

Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	8.00
Old rolled brass	7.75
Admiralty condenser tubes	8.00
Muntz metal condenser tubes	7.50
Plated brass sheet, pipe reflectors	7.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]

OPA Group 4

Automobile radiators	7.00

OPA Group 5

Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Aluminum

Plant scrap, segregated

2S solids	9.00
All other solids	8.50
Borings and turnings	
W'rt alloys (17S, 18S, 32S, 52S)	7.50
High grade alloys	7.00
Low grade alloys	6.50

Plant scrap, mixed

All solids	7.50
Borings and turnings	5.50

Obsolete scrap

Pure cable	9.00
Old sheet and utensils	7.50
Old castings and forgings	8.00
Pistons, free of struts	8.00
Pistons, with struts	6.00
Old alloy sheet	7.00

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	8.00

Mixed, contaminated plant scrap

Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.50
Die cast slab	5.50
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices for soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25½
Electrolytic, full size	22½
cut to size	30½
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23¾
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz. lots	40.32–41.135
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc sulphate, 89% crystals, bbls.	6.30

SCRAP

. . . News and Market Activities

Industry Asked for Dormant Scrap

By D. C. MacDONALD
Associate Editor

• • • **Without any emergencies,** the nation's scrap stocks represent only about a two months' supply. That is not a big enough margin of safety for victory and the bulk of the obligation belongs to industry. Production scrap, railroad scrap and dormant and obsolete equipment can bolster this weakness in raw material supplies for the steel industry. Many circumstances make big time scrap collection necessary, many more make it our job.

The job is primarily one for industry because home collections have been exhausted, farm scrap is not plentiful and a shortage of men makes it hard to get; auto graveyards have less and less to offer as autos thin out and drivers coax out every last mile. On the other hand, the need for a scrap safety factor is real.

Scrap segregation and supply on the Pacific Coast are discussed in this week's column "West Coast" appearing on Page 80.

Four coal strikes have reduced both coke and pig iron supplies, have already caused an excessive use of scrap during the emergency periods and may again call for heavy scrap charges to maintain steel production. The ore shipping season started 31 days late and may close early. The ore goal is at least 8,000,000 tons behind schedule. Scrap may have to double for ore to some extent.

Production scrap will flow with production. Railroad scrap flow is being organized to the limit by a coalition of the railroad companies. Where heavy industry can help most is through constant junking of all dormant scrap and every piece of obsolete equipment that can be so identified.

Dormant scrap is a broad term used to describe every piece of idle metal in your plant. It may be obsolete tools, jigs, dies or fixtures, machinery that is idle or unrepairable, old piping, conduit, lighting fixtures, ventilating ducts, structural iron, broken castings, obsolete patterns—nearly everything not immediately usable. WPB says "if it hasn't been used in the last three months, and if someone can't prove that it's going to be used in the next three—find a use for it—or 'scrap' it." That will define dormant scrap.

Over 600 industrial salvage groups are organized, 7000 executives and 74,000 plant salvage managers are already working to achieve the nation's scrap goal. You will want to help too. Here's what you can do:

(1) Appoint a top executive with authority to make decisions to take full charge and make him responsible for results (2) see that a salvage committee is organized including at least one member of every department of your plant (3) survey your plant for every possible source of dormant scrap (4) inventory everything in the plant and tag it scrap or otherwise (5) sell your organization these facts and don't consider this just a drive—do it every day.

•

Pittsburgh—No change. Open hearth and blast furnace grades in heavy demand. Alloy scrap a drug on market. **New York**—Scrap is slow. Alloy scrap too plentiful. Cast too scarce. **Philadelphia**—Strong demand for open hearth grades, borings, turnings. Low phos is free. Mill inventories decreasing. Electric furnaces seem well stocked. **Cincinnati**—Material flow slow but meeting needs and building some stocks. No report on drives yet. **Buffalo**—Yard stocks looking bare in big spots. Alloy ban still on. One consumer bundling own sheet scrap. Mills don't seem worried. **Boston**—Yards report shipments down 25 per cent from 1943 peak. Brokers report dull week. Lack of heavy scrap noted. Supplies coming mostly from production. **Birmingham**—Consumer demand slightly improved. No buying on scale large enough to build inventory noted. **Cleveland**—Scrap shortages here reported easing. Consumption has fallen below supply temporarily. Industrial material making up bulk of flow. Household scrap reported negligible.

•

Scrap Aim Backsliding

• • • The Industrial Salvage Branch of WPB frankly admits that while those who are active in the scrap drive are increasing the supply appreciably, still too many are not contributing and many goals will fall short. Few figures are available. Household scrap in a few areas is producing one-third of last year's total, in many areas as low as one-twelfth of quota. Railroad scrap and production scrap are flowing well. Auto graveyards, although up last month for the first time this year, are contributing relatively small tonnages. Dormant plant scrap, must produce more. Farm scrap is lagging. WPB states that the current drive cannot end on Nov. 15, as first planned, but must continue for the duration.

Drive to Last Duration

Washington

• • • **Because of the increasing** amount of iron and steel scrap needed to maintain our production requirements and the fact that the recent coal strike caused an increase in the amount of scrap used in steel furnaces, H. M. Faust, Director of the WPB Salvage Division announced last Friday that the "Victory Scrap Bank" drive, scheduled to terminate Nov. 15, has been continued indefinitely.

WAR PRODUCTION BOARD
INDUSTRIAL SALVAGE
VICTORY SCRAP DRIVE

Courtesy WPB Industrial Salvage Division

Name of Company

Address

THE POUNDAGE LISTED BELOW WILL BE DISPOSED OF IMMEDIATELY AND REPORTED TO THE CHAIRMAN ON MONTHLY REPORT CARD W.P.B. 919

	Approximate Pounds
MACHINERY	
STRUCTURAL METAL	
DIES AND TOOLS	
OTHER EQUIPMENT (Do not include production scrap)	

*State if demolition work is needed.

Committeeman

Company Official

No. 6498

THIS CARD IS THE PROPERTY OF THE WAR PRODUCTION BOARD

IT'S GETTING LATE: Have you returned your scrap pledge card, as originally agreed? The chairman of your industry wants it back right away. Dormant obsolete equipment is needed very much. Your pledge is more than a patriotic duty—it is a commitment to aid your country in winning the war.

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES									
							Low Phos.		Heavy Structural and Plate			Foundry Steel				
	No. 1 & 2 Hvy. Melt. No. 1 Ca. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shovelling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	....	12.85	12.85	13.85	14.85	15.35	....	....	....	....	....	....	....	....	....	....	....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	18.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburg, Cal.; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.00	15.00	12.50	14.00	15.50

*Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at $14 per grosston at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. *At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakmont, Cal. Claymont, Del., includes the switching point of Chester, Pa. Chicago includes Gary, Ind., switching district.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.* For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge $2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced—$2; 75 to 85% Fe—$4; under 75% Fe—$8 per ton. Mill scale of 65% or more Fe—$8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c.

*At Memphis 50c.; Great Lakes ports $1; New England $1.25.

RAILROAD SCRAP

	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails 3 ft. and Under	Scrap Rails 2 ft. and Under	Scrap Rails 18 in. and Under
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown	$20.50	$21.50	$23.00	$23.50	$23.75	$24.00
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown	21.00	22.00	23.50	24.00	24.25	24.50
Chicago, Philadelphia, Sparrows Pt., Wilmington	19.75	20.75	22.25	22.75	23.00	23.25
Birmingham, Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.	19.25	20.25	21.75	22.25	22.50	22.75
Seattle	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00

CAST IRON SCRAP

	Group A	Group B	Group C
No. 1 cupola cast	$18.00	$19.00	$20.00
Clean auto cast	18.00	19.00	20.00
Unstripped motor blocks	15.50	16.50	17.50
Stove Plate	17.00	18.00	19.00
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Misc. Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas Oklahoma, Texas and Florida.

Group C: States not named in A and B; switching district of Kansas City, Kan., Mo.

Tool Steel Scrap Ceiling Prices Set by MPR 379, May 4, 1943

BASE PRICE SEGREGATED

	Solids, Lb. Cont. W	Turnings, Lb. Cont. W
Type 1	$1.80	$1.60
Type 2	1.60	1.40
Type 3	1.25	1.25
Type 4*	0.125	0.105
Type 5*	0.135	0.115

*Per lb. of scrap material.

BASE PRICE UNSEGREGATED SOLIDS

$1.50 per lb. contained W if 5% or more.

$1.15 per lb. contained W if over 1% and less than 5%.

$0.80 per lb. contained Mo if 1½% or more.

BASE PRICE UNSEGREGATED TURNINGS

$1.30 per lb. contained W if 5% or more.

$1.00 per lb. contained W if 1% and less than 5%.

$0.70 per lb. contained Mo if 1½% or more.

Comparison of Prices . . .

Advances Over Past Week in **Heavy Type**; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Nov. 16, 1943	Nov. 9, 1943	Oct. 19, 1943	Nov. 18, 1942
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Nov. 16, 1943	Nov. 9, 1943	Oct. 19, 1943	Nov. 18, 1942
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.89	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	24.68	24.68	24.68	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.39	25.39	25.39	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	31.34	31.34	31.34	31.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$6.50	$6.50	$6.50	$6.00
Foundry coke, prompt	7.50	7.375	6.875	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 175-187.

Composite Prices . . .

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Nov. 16, 1943	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 1
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 1
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 9
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 23
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 1
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, mutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, reductions, and in most cases freight absorbed to meet competition. Delivered prices do not reflect new 3 per cent tax on freight rates.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars[10]	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long ternes[2]	3.80¢		3.80¢									4.55¢		4.16¢	4.12¢
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester—3.00¢)					2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester—3.35¢)					3.05¢	3.31¢	
TIN MILL PRODUCTS															
Coke tin plate, base box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.50 / .75 Electro tin plate, box	$4.50 / $4.65	$4.50	$4.50 / $4.65												
Black plate, 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[13]			3.37¢
Mfg. ternes, special box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth—2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (rail)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢[13]	2.25¢		2.47¢
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit—2.70¢)					2.99¢	2.97¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton—2.70¢)						2.80¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
PLATES								(Coatesville and Claymont—2.10¢)							
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.35¢		2.45¢	2.65¢	2.31¢	2.29¢	2.15¢
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy	3.50¢	3.50¢			(Coatesville—3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem—2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester—3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester—4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester—6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester—8.55¢)								
WIRE[9]															
Bright[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester—2.70¢)					3.10¢			2.92¢
Galvanized	add proper size extra and galvanized extra to bright wire base, above.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester—3.30¢)					3.70¢			3.52¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

[1] Mill run sheets are 10c per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to certain width and length limitations. [6] For merchant trade. [7] Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. [8] Also shafting. For quantities of 20,000 to 29,999 lb. [9] Carload lot to manufacturing trade. [10] These prices do not apply if the customary means of transportation (rail and water) are not used. [13] Boxed. [13] Portland and Seattle price, San Francisco price is 2.50c. [14] This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

GOVERNMENT CEILING—Price Schedule No. 6 issued April 16, 1941, governs steel mill prices; Price Schedule No. 49 governs warehouse prices which are on another page of this issue.

EXCEPTIONS TO PRICE SCHEDULE No. 6—On hot rolled carbon bars, Phoenix Iron Co. may quote 2.35c. at established basing points, Calumet Steel division of Borg Warner may quote 2.35c., Chicago, on bars from its 8-in. mill; Joslyn Mfg. Co. may quote 2.35c., Chicago base. On rail steel bars Sweets Steel Co. may quote 2.35c., f.o.b. mill. On hot rolled sheets, Andrews Steel Co. may quote for shipment to Detroit area on Middletown base; Parkersburg Iron & Steel may quote $2.25 per hundred f.o.b. Parkersburg, W. Va. On galvanized sheets, Andrews Steel may quote 3.75c., at established basing points; Parkersburg Iron & Steel may quote $3.85 per hundred f.o.b. Parkersburg, W. Va. On hot rolled strip, Joslyn Mfg. Co. may quote 2.30c., Chicago base. On plates, Granite City Steel Co. may quote 2.35c., f.o.b. mill, and Central Iron & Steel Co. may quote 2.20c., f.o.b. basing points. On shapes, Phoenix Iron Co. may quote 2.30c. established basing points and 2.50c. Phoenixville for export.

On rail steel merchant bars, Eckels-Nye Corp. may charge 2.40c. On tubing, South Chester Tube Co. may price Gulf or Pacific Coast all-rail shipments and shipments west of Harrisburg on basis of f.o.b. Chester. On lend-lease sales to eastern seaboard, Sheffield Steel Co. and Colorado Fuel & Iron Corp. may sell f.o.b. mill. SEMIFINISHED STEEL—Follansbee Steel Corp. may sell forging billets at $40.50 f.o.b. Toronto; Continental Steel Corp. may sell Acme Steel Co. at $34 for rerolling billets plus extras and freight; Ford Motor Co. may sell rerolling billets at $34 f.o.b. Dearborn; Andrews Steel Co. may sell forging billets at $50 at established basing points and slabs at $41; Empire Sheet and Tin Plate may sell slabs at $41 at established basing points and sheet bars at $39 f.o.b. mill; on lend-lease sales Northwestern Steel & Wire Co. may charge $41 per gross ton f.o.b. mill for rerolling billets; on lend-lease sales Wheeling Steel Corp. may charge $36 per ton for small billets, f.o.b. Portsmouth and $37 per ton for sheet bars f.o.b. Portsmouth; Laclede Steel Co. on semi-finished sales for lend-lease shipped to eastern seaboard may use Chicago basing point prices f.o.b. Alton and Madison, Ill. ALLOY STEEL BARS—Texas Steel Co. may use Chicago base f.o.b. Fort Worth.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
Philadelphia	$3.518	$4.872[8]	$5.018[a]	$3.922	$4.772	$3.605	$3.666	$3.882	$4.072	....	$7.116	....	....
New York	3.590	4.613[3]	5.010	3.974[6]	4.774	3.768	3.758	3.853	4.103	$6.008	7.158	$7.303	$8.453
Boston	3.774	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.312	7.344	8.494
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Washington	3.596	4.841	5.196[4]	4.041	4.741	3.796	3.930	3.941	4.041	....	....	....	....
Chicago	3.25	4.20	5.23	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.90	8.85	8.00
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.137	7.087	8.237
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.106	6.85	8.00
Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.90	6.85	8.00
Detroit	3.45	4.50	5.00[4]	3.70	5.909[17]	3.609	3.661	3.45	3.80	6.08	7.23	7.159	8.309
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.247[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.281	7.231	8.381
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	7.15	6.85	8.25
St. Paul	3.51	4.46	5.257[4]	3.86	4.35[17]	3.81[13]	3.81[13]	3.76[13]	4.361	6.09	7.24	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.443	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.23	7.18	8.33
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.85[7]	4.66	5.25	4.10	....	3.95	3.95	3.90	4.31	....	....	....	....
New Orleans	3.95	4.95	5.25	4.20	....	3.90	3.90	4.10	4.60	....	....	....	....
Houston	3.763	5.573[3]	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.203	6.10[4]	4.95	5.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.304	6.354	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	....	....	....	....	....	....	....	....	....	....	....	....	....
Portland	4.65[11]	6.60[4]	5.754	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (N. E.) STEELS

(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10c	$2.00	.....	.....
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.10/ .25	.....	.....	.65	13.00	.....	.....
NE 9262	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.25/ .40	.....	.....	.65	13.00	.....	.....
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	$25.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9460	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9545*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1999 lb.; strip, extras on all quantities; bars, 1500 to 39,999 lb.; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 to 39,999 lb. (15) 1000 to 39,999 lb. (16) 1500 to 39,999 lb. (17) 2000 to 39,999 lb. (18) 3500 to 39,999 lb.

(*a*) Philadelphia: Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

***Recommended for large sections only. Note: The extras shown above are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton on semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.**

PRICES

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Delivered prices do not reflect new three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00
Alloy steel: Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton	$54.00

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

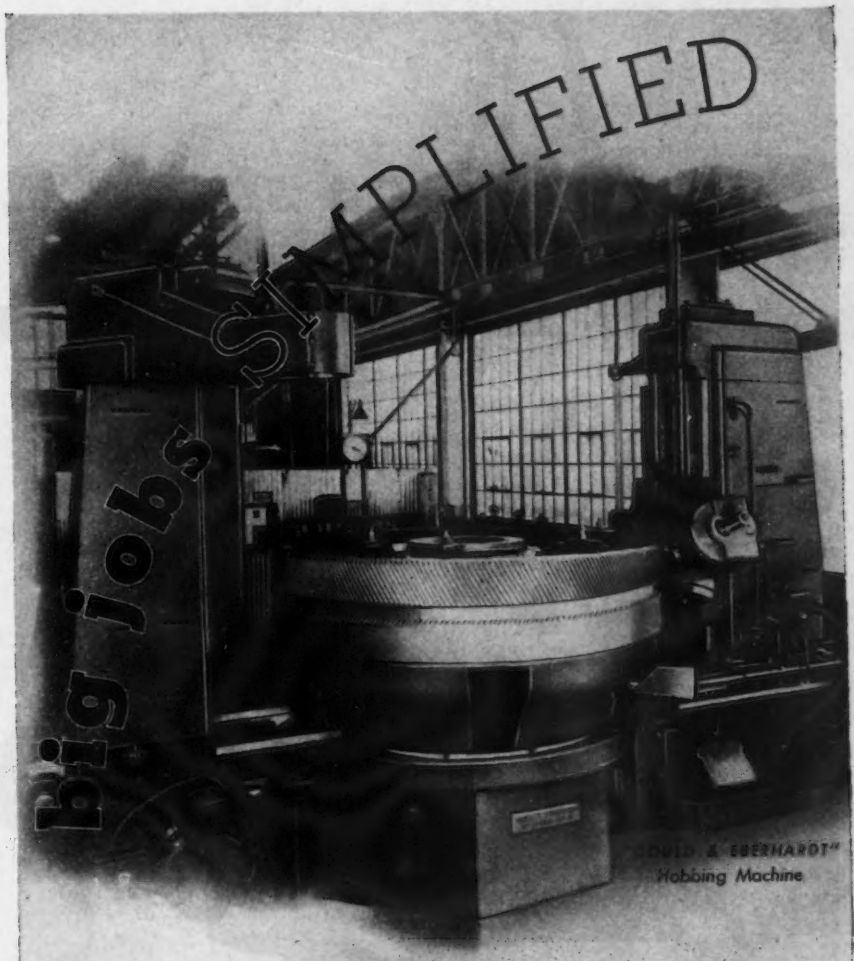
Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.



● Mechanical giants which otherwise would demand an operator's continuous attention to oiling—or have their life-span severely cut—are made self-oiling by machine manufacturers' foresight. With BIJUR-equipped machines there are fewer shut-downs . . . less "time out" for repairs and maintenance.

Peak-load production is insured!

BIJUR LUBRICATING CORPORATION

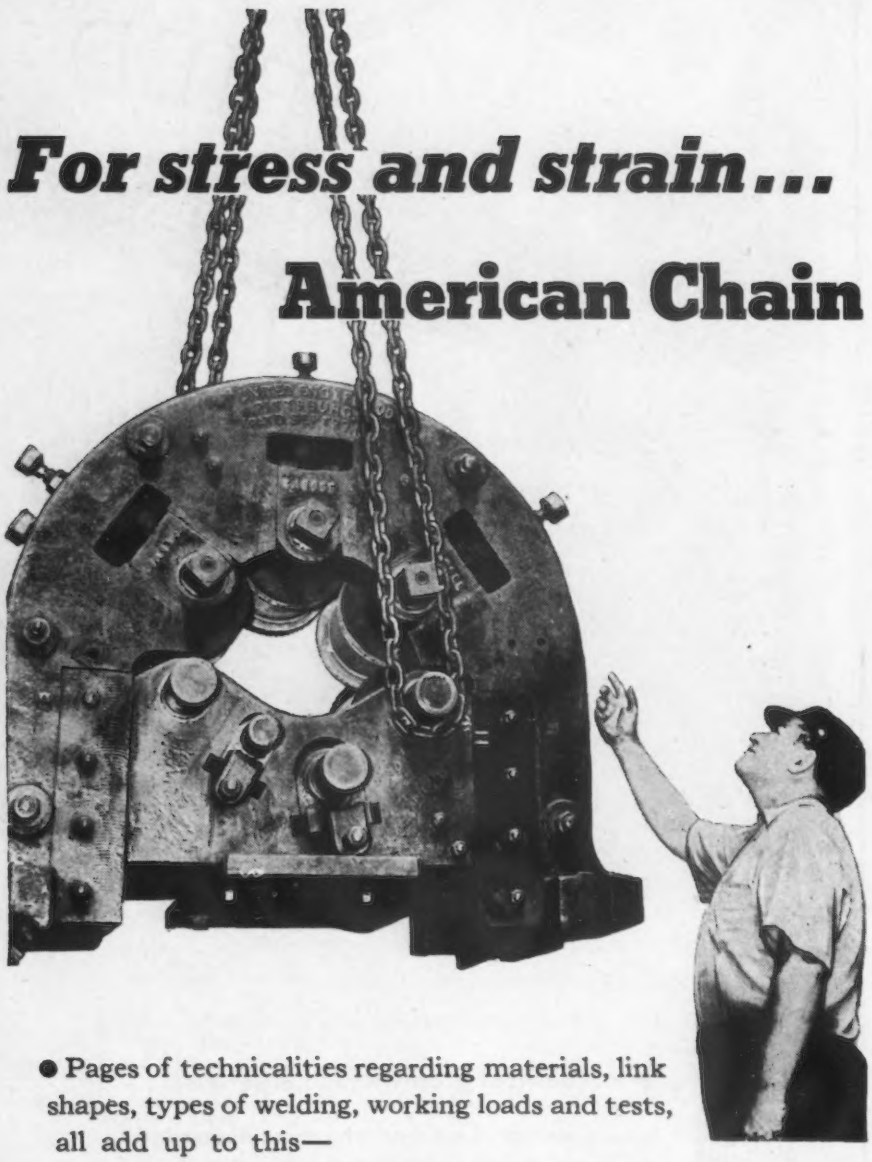
LONG ISLAND CITY • NEW YORK

BIJUR

AUTOMATICALLY *Correct* LUBRICATION

1613

For stress and strain... American Chain



● Pages of technicalities regarding materials, link shapes, types of welding, working loads and tests, all add up to this—

for stress and strain use American Chain.

Engineers, heads of operations, purchasing agents, foremen and workers, for years have used AMERICAN CHAIN where the going was tough. Under war pressure when accidents can't be tolerated, when good men are almost irreplaceable, when production must not be interrupted—demand for AMERICAN CHAIN has been highest in our history. You can use AMERICAN CHAIN with confidence. It won't let you down.

★

Weldless Chain is being substituted successfully in many applications, for welded chain and Manila rope. Write us about your chain and rope problems. Orders should be accompanied by highest possible preference ratings.

AMERICAN CHAIN DIVISION

York, Pa., Boston, Chicago, Denver, Detroit, Los Angeles, New York
Philadelphia, Pittsburgh, Portland, San Francisco

In Business for Your Safety **AMERICAN CHAIN & CABLE COMPANY, INC.**
BRIDGEPORT • CONNECTICUT

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove Bolts

Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets *(½ in. and larger)*

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets *(7/16 in. and smaller)*

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws

	Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Filister head cap, listed sizes	67

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angle bars, 100 lb.	2.70

(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

PRICES

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cutnails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	$3.05
Annealed galvanized fence wire	3.40
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

	Black	*Galv.*
Steel (Butt Weld)		
⅛ in.	63½	51
¼ in.	66½	55
⅜ to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
⅛ in.	25	3½
¼ in.	30	10
⅜ and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
⅛ in.	61½	50½
¼ in.	65½	54½
⅜ to 3 in.	67	57
Wrought Iron (Same as Above)		
⅛ in.	25	6
¼ in.	31	12
⅜ to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card. F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

You can't have spring quality and service without it!

PROPER BALANCE, timing and coordination between skilled employees, modern equipment and methods, and rigid production control are responsible for Accurate quality and service—to give you the springs and wireforms you want...*when you want them.*

From the specification stage through the precision manufacturing operations and the steps of testing and inspection, the Accurate organization works in smooth, production-building balance.

Accurate engineers, too, are specially trained to work hand-in-hand with your own engineers to produce the precise springs or wireforms for the job, thus eliminating waste motion, saving time, trouble and headaches.

We know you will like the friendly cooperation and product quality which you will find at Accurate. When you have spring and wireform problems, bring them to us.

ACCURATE SPRING MFG. CO.
3819 W. LAKE ST. ★ CHICAGO 24, ILL.
SPRINGS ★ WIRE FORMS ★ STAMPINGS

Accurate Springs

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston††	*$25.50*	*$25.00*	*$26.50*	*$25.50*	.....	.....
Brooklyn	*27.50*	.....	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass.††	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa.	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa.*	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*23.94*	*23.94*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	.....
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown*	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	$34.00
Lyles, Tenn. fc.†	.....	.....	.....	.....	.....	33.00
St. Paul	*26.76*	.....	*27.26*	*26.76*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

**Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.11 a ton over maximum basing point prices.

†Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

††Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company, Mystic Iron Works, Everett, Mass., at $2 per gross ton above maximum prices.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.51 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. For ton lots f.o.b. shipping point, in cents per lb.

Copper, electrolytic, 150 and 200 mesh	21⅛ to 23½c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh	13½ to 15c.
Iron, crushed, 200 mesh and finer	4c.
Iron, hydrogen reduced, 300 mesh and finer	63c.
Iron, electrolytic, unannealed, coarser than 300 mesh	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh	42c.
Iron, carbonyl, 300 mesh and finer	90c.
Aluminum, 100 and 200 mesh.	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.80
Lead, 100, 200 & 300 mesh,	11½ to 12½c.
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh,	8½c. plus metal
Tin, 100 mesh	58¾c.

*Freight allowed east of Mississippi.

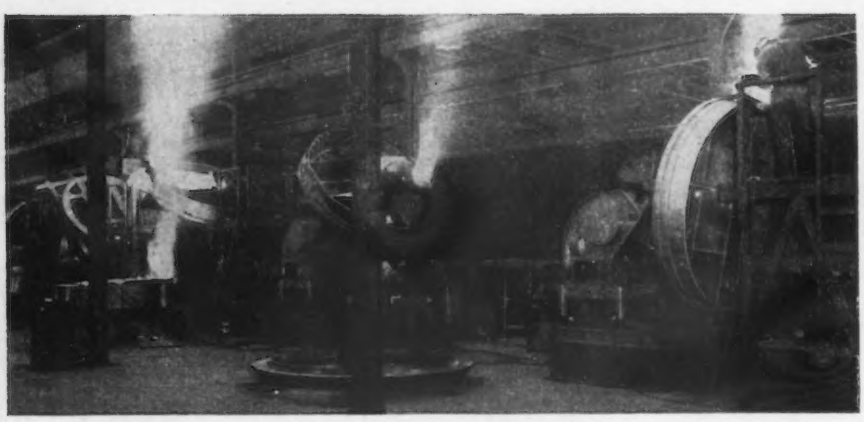
BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld. Hot Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04	12.33
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.84

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	55%



WELDING PRODUCTION GOES UP WHEN RANSOME POSITIONERS GO IN . . .

This statement is no empty claim. It is the summing up of results obtained by plants in every field of metal fabrication.

For Ransome Positioners really put welders and equipment to work at their top effectiveness. There's no waiting for crane service, no waste of priceless human energy. Each welder shifts his work independently and without effort. With a downhand position for every weld, larger rods can be used, which greatly reduces the cost per pound of deposited metal.

And welding *quality* goes up too. Here again, the downhand position pays off in stronger, cleaner, and more uniform welds.

To get the whole story . . . *write for new Bulletin*

Industrial Division RANSOME MACHINERY COMPANY Dunellen, New Jersey

Subsidiary of WORTHINGTON PUMP AND MACHINERY CORPORATION

Ransome WELDING POSITIONERS

PRICES

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

LAKE SUPERIOR ORES

($1.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesapa, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

COKE

Furnace

	Per Net Ton
†Connellsville, prompt	$6.50*

Foundry

†Connellsville, prompt	7.50
Fayette County, W. Va. (Beehive)	8.10
By-product, Chicago	12.25
By-product, New England	13.75
By-product, Newark	12.40 to 12.95
By-product, Philadelphia	12.38
By-product, Cleveland	12.30
By-product, Cincinnati	11.75
By-product, Birmingham	9.00†
By-product, St. Louis	12.02
By-product, Buffalo	12.50

Maximum by-product coke prices established by OPA became effective Oct. 1, 1941.

*Hand-drawn ovens using trucked coal are permitted to charge $7.00 per net ton, plus usual transportation. Maximum beehive furnace coke prices established by OPA, Feb. 8, 1942. †F.o.b. oven.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

REFRACTORIES

(*F.o.b. Works*)

Fire Clay Brick	*Per 1000*
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60
Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00
Chrome Brick	*Per Net Ton*
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$44.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

HEAT-TREATED STEEL SHOT

We manufacture shot and grit for endurance

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

The unprecedented demand for our—

Heat-Treated Steel Shot and Heat-Treated Steel Grit

has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

HARRISON ABRASIVE CORPORATION

Manchester, New Hampshire

HEAT-TREATED STEEL GRIT

Did you Know?

Over 50% of furnace wall radiation losses alone can be stopped? Therm-O-Flake Insulation is preferred for this work in most steel plants.

Here's why!

Highest insulating value — easy to apply — low maintenance — low cost — high reclamation — sticks tightly to silica or basic brick — permits closer control of fuel-air ratios — reduces cold air infiltration.

Write for literature

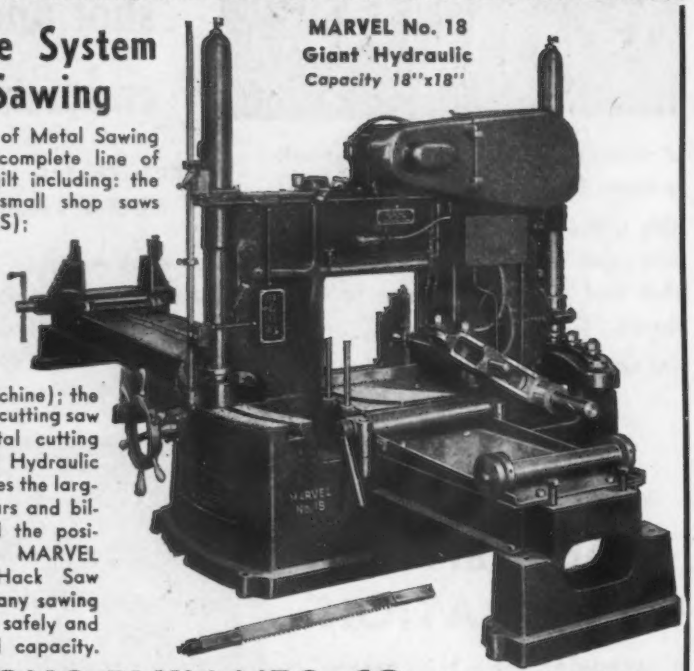
Illinois Clay Products Company
JOLIET, ILL.

Therm-O-flake
HIGH TEMPERATURE INSULATION
BRICK - BLOCK - COATINGS - CONCRETE - GRANULES

MARVEL SAWS

A Complete System of Metal Sawing

The Marvel System of Metal Sawing provides the most complete line of sawing machines built including: the most widely used small shop saws (80% are MARVELS); the fastest high speed hack saws built (automatics that will cut-off identical bars with no more operator attention than an automatic screw machine); the most versatile metal cutting saw—(a universal metal cutting band saw). Giant Hydraulic hack saw that handles the largest and toughest bars and billets with ease; and the positively unbreakable MARVEL High-Speed-Edge Hack Saw Blades that permit any sawing machine to operate safely and continuously at full capacity.



MARVEL No. 18
Giant Hydraulic
Capacity 18"x18"

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5700 Bloomingdale Ave. **Chicago, U. S. A.**

Eastern Sales Office
225 Lafayette St.
New York

LEWIN-MATHES *Got the right answer at*

ETNA

They had a job of pointing heavy-walled copper tubing, and wanted to speed up the operation. Just how to do it didn't appear on the horizon, and so Lewin-Mathes did the safe and logical thing—they put their swaging job up to Etna.

The answer to that problem is illustrated on this page. It's a modern Etna Swaging Machine that points *more* copper tubes per hour in less time at less cost. If you have a problem involving tapering or reducing tubing and solid rounds—ask Etna about it.

Etna has the swaging machines from ⅜" to 4" and the experience to help you get the most out of this type of machine.

IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING...
"Ask ETNA About Swaging"

ETNA
MACHINE COMPANY
TOLEDO OHIO

PRICES

Ferromanganese

78-82% manganese, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Ton lots (packed)	141.00
Less ton lots (packed)	148.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Electrolytic Manganese

99.9% manganese, maximum base contract price per lb. of metal, bulk, f.o.b. shipping point, with freight allowed to destination.

Size, 1" x D.	Eastern Zone	Central Zone	Western Zone
Carload lots	37.60c.	37.85c.	38.15c.
l.c.l. lots	39.60c.	38.60c.	40.65c.

Spiegeleisen

Maximum base contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 1% max. Si	19-21% Mn 1% max. Si	26-28% Mn 1% max. Si
Carloads	$35.00	$36.00	$49.50
Less ton*	47.50	48.50	62.00

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% silicon	6.65c.	7.10c.	7.35c.
75% silicon	8.05c.	8.20c.	8.75c.

Spot sales 45c. per lb. higher for 50% Si; 30c. for 75% Si. For extras and premiums see MPR 405.

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorus or over.

*Official OPA price established June 24, 1941.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% silicon.

	Eastern Zone	Central Zone	Western Zone
Car lots	3.35c.	3.50c.	3.65c.

Spot prices ¼c. higher per lb. of briquet. For premiums and extras see MPR 405.

Silicomanganese

(Per gross ton, delivered, carloads, bulk)

3.00 carbon	$120.00*
2.50 carbon	125.00*
2.00 carbon	130.00*
1.00 carbon	140.00*
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.†
Packed	6.05c.†
Less ton lots	6.55c.†

*Spot prices are $5 per ton higher.
†Spot prices ¼c. higher.

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carlots, f.o.b. shipping point, freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
0.03% carbon	25.00c.	25.40c.	26.00c.
0.06% carbon	23.00c.	23.40c.	24.00c.
0.10% carbon	22.50c.	22.90c.	23.50c.
1.00% carbon	20.50c.	20.90c.	21.50c.
2.00% carbon	19.50c.	19.90c.	20.50c.

Spot prices are ¼c. higher per lb. contained Cr. For extras and premiums see MPR 407.

Other Ferroalloys

Ferrotungsten, delivered, carlots, per lb. contained tungsten	$1.90
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Ferrovanadium, 35%-40%, contract basis, f.o.b. producers plant, usual freight allowances, open-hearth grade, per lb. contained vanadium	$2.70
Special grade	$2.80
Very special grade	$2.90
Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5	$1.10
Ferroboron, contract basis, 17.50% boron minimum, f.o.b. Niagara Falls, carlots, per lb. alloy	$1.20
Ton lots	$1.25
Silcaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	23c.
Silvaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	40c.
Grainal, f.o.b. Bridgeville, Pa., freight allowed 100 lb. and over, maximum based on rate to St. Louis, per lb.	45c.
Bortam, f.o.b. Niagara Falls Ton lots, per lb.	45c.
Less ton lots, per lb.	50c.
Borosil, 3% to 4% boron, 40 to 45% silicon, f.o.b. Philo, Ohio, per lb. contained boron	$7.00
Ferrocolumbium, 50% to 60%, f.o.b. Niagara Falls, ton lots, per lb. contained columbium	$2.25
Less ton lots	$2.30
Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium	$1.23
Less ton lots	$1.25
Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium	$1.35
Less ton lots	$1.40
High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per gross ton	$142.50
3%-5% carbon	$157.50
Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Ferromolybdenum, 55-75 per cent, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	95c.
Calcium molybdate, 40%-45%, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	80c.
Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo	80c.
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo	80c.
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00
Zirconium, 35-40%, contract basis, carloads in bulk or package, per lb. of alloy	15c.
Less ton lots	16c.
Zirconium, 12-15%, contract basis, carlots, bulk, per gross ton	$102.50
Packed	$107.50
Less ton lots	$112.50
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, per lb.	7.50c.
Ton lots	8c.
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.	
Car lots	9.50c.
Ton lots	10.00c.
Less ton lots	10.50c.

ANY METAL • ANY PERFORATION

Industrial—Well balanced screens of excellent material and workmanship to assure maximum screen production combined with durability.

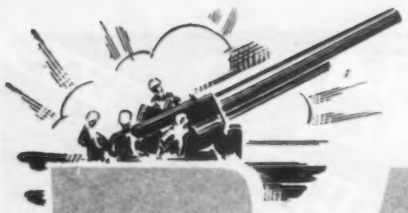
Ornamental—Approved patterns and finishes including many exclusive and characteristic designs for grilles and furniture. We invite your inquiries.

The Harrington & King Perforating Co.

5657 FILLMORE STREET—CHICAGO 44, ILL.
Eastern Office, 114 Liberty Street, New York 6, N. Y.

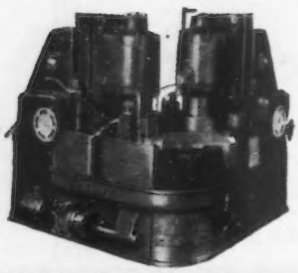
GOOD SPRING DESIGN
was never MORE IMPORTANT!

With facilities crowded to the rafters, it's more important than ever to be sure every item in war production be designed and produced accurately, speedily and economically. That goes for springs, wire forms, and small stampings, too! Helping to combine operations—to eliminate waste motion—to streamline production has been common practice with B-G-R spring engineers for years. Successful experience in meeting peace-time mass-production schedules puts B-G-R in a position to meet the super-production needs of the largest spring users in the world today—our fighting forces. Let B-G-R "spring-skill" help you, too!

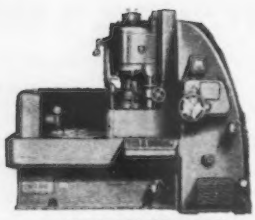


IF IT'S A FLAT SURFACE THERE'S A HANCHETT TO GRIND IT

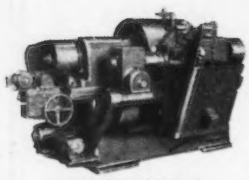
RANGE TO COVER *all* OF YOUR SURFACE GRINDING JOBS



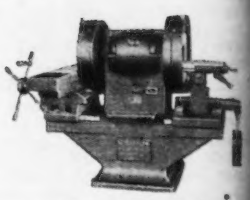
VERTICAL MULTI-SPINDLE ROTARY TYPE SURFACE GRINDER



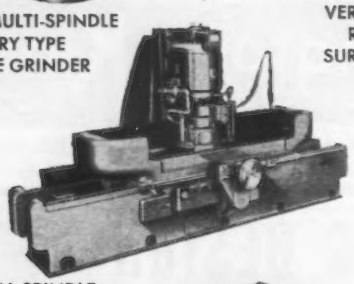
VERTICAL SPINDLE ROTARY TYPE SURFACE GRINDER



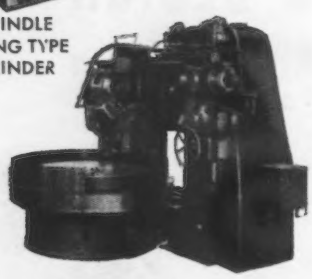
DOUBLE SPINDLE DISC GRINDER



SINGLE SPINDLE DISC GRINDER



VERTICAL SPINDLE RECIPROCATING TYPE SURFACE GRINDER



ROTARY PLANO GRINDER

TRAVELING WHEEL FACE GRINDER

When selecting a surface grinder your first consideration is for a machine which will most efficiently solve your grinding problems. Hanchett engineers can give you an unbiased opinion. The wide range of Hanchett types makes possible this unique service wherein the grinding *principle* is the prime factor. Made by specialists in Flat Surface Grinding, the complete Hanchett line includes all of the types shown here, and many others. If you are experiencing difficulties with surface grinding jobs on which precision and high production are of paramount importance, let our engineers recommend the type of surface grinder which will provide the best solution. Write today outlining your requirements.

Ask for Catalog No. 170 I-1

HANCHETT GRINDERS — BIG RAPIDS MICHIGAN

IF IT'S A FLAT SURFACE—THERE'S A HANCHETT TO GRIND IT

HANCHETT MANUFACTURING CO.
BIG RAPIDS, MICHIGAN U.S.A.